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The Medical School and the Student Health Service*

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The Association of American Medical Colleges is to be commended for its interest in including on the program of its fiftieth annual meeting a symposium on the Student Health Service—which is not only playing an important rôle in helping maintain and promote the health of university students but is making indirect contributions to the general public health movement of our time.

My part in this symposium will be devoted largely to the medical school's interest in and its contributions to the Student Health Service, and to possible contributions of the student health service to medical education.

OBJECTIVES AND FUNCTIONS OF THE STUDENT HEALTH SERVICE

Before considering relationships between the medical school and the Student Health Service in a university, it is important that we review, briefly, the objectives and functions of a constructive and comprehensive Student Health Service.

Protection, conservation and promotion of the health of students, are its objectives.

The goal should be positive health and mental and physical efficiency—helping students build up and maintain harmoniously developed, sound, vigorous and long lasting body-mind machines; helping them acquire adequate knowledge of the fundamentals of healthful living so far as we know these today, and adequate knowledge of modern health-medical practices for maintaining health; and encouraging intelligent interest in and intelligent attention to health and physical efficiency not only while in college but after college days are over as well.

The functions of a Student Health Service fall into three general interrelated groups of interests and activities:

(1) *Personal Services*—These include, among other things, periodic health examinations; attention to the several factors making up physiologic hygiene; provisions for sound daily habits of work and recreation; prevention and correction of defects when actual or potential physical handicaps; utilization of

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biologicals in prevention of communicable diseases; and the treatment and care of the student when physically below par, ill, or injured.

(2) *Sanitation*—Adequate attention to the environment of students both on and off the campus, with the cooperation of the city health department personnel and machineries. Included in this group are such matters as sanitation of student eating places and rooming houses; ventilation in its modern conception; illumination and facilities for study; sleep and recreation provisions; fire hazards; control of those environmental routes over which bacterial and other parasitic diseases are transmitted—water, milk, food, insect routes, etc.

(3) *Health Education*—Helping students, through individual information and advice and through formal instruction, to acquire an informed, intelligent interest in both physiologic and community hygiene and an appreciation of modern health-medical practices possible for maintaining health, is an important function of a Health Service. A Student Health Service which fails to appreciate the importance of health education and neglects to utilize its unusual opportunities for this to the fullest measure, is not worthy of the name. The personal service and sanitation measures of the Health Service should be regarded as laboratory aspects of health education.

When given proper emphasis, this health education item should contribute something to "making the world safe" for the practice of scientific medicine. Reaching thousands of students each year, it should help produce a fair sized "general public" less susceptible to pseudoscience, cults and fraud.

THE STUDENT HEALTH SERVICE A HEALTH CENTER

With these objectives and functions, it is apparent that a Student Health Service has something of the same relation to the student and the student community that a progressive governmental department of health has to a municipality, county or state. At any rate, those directly responsible for the operation of a Student Health Service must keep in mind all of its objectives. Otherwise the Health Service tends to become a unit devoted entirely to the diagnosis, treatment and care of ill or injured students only and not a Health Service for all the students.

It is this particular and very important function—the treatment and care of students who are indisposed, ill or incapacitated—that usually takes most of the funds available, and obscures, or reduces to seemingly minor positions, the other functions of the Service. Ordinarily, parents, students and many faculty members—including most of those in the medical school, think of a Student Health Service as wholly and exclusively concerned with diagnosis, treatment and care of illness and injuries. In other words, the general impression, unfortunately, is, that the Health Service is nothing more than a clinic and hospital for students, and that the health fee paid by students, directly or indirectly, may be regarded as sickness insurance. Obviously, the scientific treatment and care of illness and injuries must be one of the major concerns of a Student Health Service, even its major concern, perhaps. If this were its only concern or function, it might well be conducted by the medical school when nearby, providing, of course, that

dispensary and hospital quarters and procedures were arranged to meet student desires and needs. It goes without saying, that students demand a form of attention somewhat different in certain respects to that ordinarily given to general ambulatory patients and general bed patients going to a medical school's dispensary and hospital. But it is not my purpose to discuss these differences of procedure at this time. For, even though the major portion of the annual budget of a Student Health Service does have to be used to provide personnel and machineries for dealing with morbidity, I think all who give the matter thought will agree that the clinic-hospital services are not, and should not be, the only concern of a constructive student health service.

MEDICAL SCHOOL COOPERATION AND INTEREST

While on this particular function of the student health service—the treatment and care of illness and injuries, therapeutic measures, I might add that it has been my policy in the organization and operation of Student Health Services, to seek and obtain the very closest cooperation from the clinical departments of the medical school. Quoting from my annual report to the president of the University of Michigan, 1921-1922, the first year of the organization at Michigan of the Division of Hygiene and Public Health, of which the Student Health Service was made a unit:

> *"Postgraduate Fellowships in Medicine.*—Through a system of postgraduate fellowships in the Medical School, paid for by the Health Service, a close relationship will be established with the heads of clinical departments in the Medical School. These fellowships will be open to graduates of recognized medical schools who have completed internships and are specializing in the clinical department concerned.
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> Each Fellow will be chosen by the Head of the clinical department concerned, preferably someone already working with him, and will be approved by the Director of the Health Service.
>
> These Fellows will devote one-half time to work in the department of specialization and one-half time in the Student Health Service.
>
> Clinical departments with part-time representatives on the Health Service staff will include: Medicine, Surgery, Otolaryngology, Ophthalmology, Dermatology, and Infectious Diseases.
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> The advantage to the Health Service from such an arrangement with the heads of the clinical departments will be that personnel and facilities of the clinical departments in the Medical School can be made available for special and expert diagnosis and treatment when needed. The Head of the Department of Surgery, for example, through his Fellow will have charge of surgical cases among students, and these, when serious, will have his personal attention.
>
> The Medical School will be benefited by this arrangement in that postgraduate work and research will be stimulated.
>
> Past experience at other institutions has proven the value of this arrangement.
>
> Similar postgraduate fellowships will be arranged for with the College of Dentistry."

That report was made in 1921-22 at Michigan; I had tried out the plan at Minnesota. I still think the arrangement a good one.

An angle to Student Health Service therapeutic medicine in which the medical school may well be interested, is that much of it has to do with prevalent illnesses usually seen first at early stages of the illness. Ordinarily, the teaching hospital of a medical school has a tendency to fill up with cases of more or less chronic and advanced illnesses which may be of much scientific interest but which, comparatively speaking, may be of little social significance. Usually, these

cases of more or less chronic and advanced illnesses make up a large proportion of dispensary visits as well. A Student Health Service dispensary, and in a large measure its hospital, on the other hand, deal, for the most part, with the more prevalent illnesses; and its patients, because of the nature of the Student Health Service set-up, usually present themselves while still in early stages of the illness. Interns and senior medical students, under the supervision of the medical staff, would gain something from observation or possibly specially arranged participation in the daily routine of the Health Service dispensary. This experience should stimulate interest in and acquaintance with an important phase of the art or practice of medicine usually not so readily available in most medical school dispensaries and hospitals. May I suggest that medical schools in those universities where large Student Health Services are operated explore the possibilities of utilizing them for this special type of observation clinical teaching.

The extent of cooperation between the medical school and the Student Health Service in respect to the treatment and care of illness and injury among students whereby reciprocal benefits are derived, depends on several factors, such as location—whether the university is in a large or small city—and the distance between the medical school and the Health Service; the size, personnel and facilities of the Health Service; local traditions, etc. One would find it almost impossible, therefore, to make any general pronouncements as to what this relationship should be and to what extent the medical school should participate in the medical affairs of the Health Service. Certainly, each medical school should be interested in the operation of the Student Health Service when on the same campus, and be willing to cooperate, when needed, in providing medical and surgical services of the highest quality.

For the medical school to see and appreciate the whole picture; for it to recognize that important as the clinical or therapeutic functions of the Student Health Service are, they make up only one item on the Service's list of objectives and functions; and for the medical school to appreciate the need for and the importance of all the items in the list of objectives and functions of a constructive Student Health Service, and the place and rôle of the Health Service in the modern health-medical service movement—these, in my judgment, are more important to medical education than for the medical school to be interested in just one item of clinical or therapeutic medicine in the Health Service or to assert a proprietary interest in it.

Let me explain what I mean by this statement. The traditional medical school centers its four years of medical education, for the most part, and the subsequent internship of one or more years, on pathology-morbidity—its diagnosis and treatment. The more advanced the pathology, usually the greater is the interest of the student in it. In other words, medical education is almost wholly concerned with preparing its students to work on the last few inches of a yardstick of a morbid process. It is on these relatively few inches that the medical profession, as a whole, generally works, many of its members struggling along, competing with each other for something to do. This is true to such an extent, it seems, that the Commission on Medical Education was of the opinion that there

were, in 1928, 30,000 too many physicians in the United States. I have wondered just how much concentration on these "last inches" of morbid processes in medical education and, therefore, in medical practice, may have contributed to the economic plight of many physicians in recent years.

Coming back to this "yardstick," traditional medical education and traditional medical practice, for the most part, center on the last few inches. Over on the first inch, or first few inches, we find public health and preventive medicine. Between can be seen a length of, let us say, some thirty inches practically unoccupied by scientific medicine, permeated by ignorance and superstition, and occupied by pseudoscience, cults and fraud.

One of the big problems of the modern medical school, I think, is to provide an education which will interest those preparing for medical practice in all 36 inches of the morbid process yardstick, and will prepare them to practice preventive medicine as well as curative medicine. Physiology and hygiene would, then, receive greater interest and emphasis, along with pathology-morbidity. The consuming interest would no longer remain centered almost wholly on the last few inches of a morbid process yardstick.

The constructive Student Health Service is attempting to emphasize the earlier inches of this "yardstick" and operate as fully as it can in the realm of public health and preventive medicine. It has a difficult time in its efforts to do this. The loadstone of traditional medical education and practice, with its consuming interest in advanced morbidity, constantly pulls at the Health Service policies to such a degree that its services tend to move toward those "last few inches" and finally fuse with the traditional interests, activities and machineries of traditional medical education and practice. In other words, if the other objectives of the Student Health Service are not constantly kept in mind by those in charge, and frequently explained and emphasized, a Health Service tends to become another dispensary and hospital concerned wholly with morbidity, its diagnosis and treatment.

At the University of Michigan's Student Health Service, doctors, usually comparatively young doctors with the necessary qualifications, are appointed to full time positions on the staff for a period of four years. Each serves as medical adviser to a class and remains the health counsellor for that same group throughout the four college years. During their four years of service, these physicians are expected to qualify for the degree of Master of Science in Public Health or Doctor of Public Health. The products of this experience and training should be well qualified to give advice and instruction in hygiene and preventive medicine. In addition to the full time staff there are also part time doctors in medicine, surgery, otolaryngology, etc., as described under "Postgraduate Fellowships." Students may choose, of course, the doctor they wish to consult.

TEACHING PUBLIC HEALTH AND PREVENTIVE MEDICINE TO MEDICAL STUDENTS

In recent years we have heard a great deal about teaching public health and preventive medicine in medical schools. Departments of preventive medicine are being established. A Student Health Service affords many opportunities to observe

and study the operations of instrumentalities of public health and preventive medicine. Why should not a constructive and comprehensive Student Health Service with its personal services and its sanitation and health education interests and activities, and with its close tie-up with the city health department personnel and machineries, serve as a model for the practical teaching of public health and preventive medicine? Its general set-up and operation might well be observed and studied by students enrolled in classes in preventive medicine.

The chief administrative officer of the Student Health Service, providing he is trained in public health in addition to medicine, may well be a member of the faculty of the medical school and give instruction in public health and preventive medicine.

Generally speaking, a Student Health Service devotes the week prior to the beginning of regular instruction in the fall, to health examinations of all students entering the university for the first time. At the University of Michigan, we make approximately 3,500 entrance health examinations during the week or eight days preceding the beginning of the first semester's work. Senior medical students, under supervision, should be well qualified to help with these examinations, and should profit from the experience. The importance of the health examination for early detection of defects and beginning disease processes is often brought out effectively in the reviews of physical liabilities detected in these examinations.

As has been said, all along the line of public health and preventive medicine, including personal services, sanitation and health education, a comprehensive student health service has much to offer for observation and study.

So far, I have attempted to point out some of the more or less direct interests or interrelationships of the medical school and the Student Health Service. There are several other facets in the modern Student Health Service which should be of interest to the medical school and to the other health-science professional schools in universities. These facets reflect, in some ways and to some degree, the indirect rôle that the constructive and comprehensive Student Health Service is playing in modern public health education and in the modern public health movement with its newer social and economic implications. Let me specify these as follows:

HEALTH-MEDICAL ECONOMICS

Particularly since the publications of the Committee on the Costs of Medical Care, with its majority and minority reports, the traditional practice of medicine and the common procedures for the payment of costs have been "on the gridiron." Much has been printed and much has been said. Almost innumerable studies and surveys have been made and are being made by lay organizations and by the health-medical professions, which may throw more light on both sides of the controversy.

It was my suggestion that the Committee on the Costs of Medical Care make a study of the operations and costs of several Student Health Services in the United States with particular reference to the group purchase and group practice

of medicine. Publication Number 19 of the Committee on the Costs of Medical Care, "University Student Health Services," was the result. Without question, the Student Health Service offers unusual opportunities for the intelligent, dispassionate study of health-medical economics with particular references to group purchase of health and medical care and to the assets or liabilities of group practice of medicine. There is a wealth of material in the annual statistical reports of Student Health Services which should prove of value to the health-medical science professions and society at large in their efforts to determine sound procedures relative to provisions for scientific health and medical services for the American people. Student Health Services should record their services and costs in statistical forms so that they may be available for intelligent use in helping solve this problem.

ADEQUATE HEALTH AND MEDICAL CARE

The problem of what should constitute adequate health and medical care for an age group or for a community is inextricably tied up with health-medical economics. We have been attempting for a number of years to determine what should constitute adequate health-medical service for the age group represented by university students. We, at the University of Michigan, feel that we are a long way from the answer to this question.

Each succeeding year, generally speaking, we see our Student Health Service at Michigan used more and more by students, as is indicated by the following statistics for the regular sessions over a span of six years:

Academic Year	1932-33	1933-34	1934-35	1935-36	1936-37	1937-38
Students entitled to service	7,532	7,314	8,082	8,777	9,421	9,620
Total dispensary calls	83,231	84,945	98,175	100,849	109,767	114,408
Daily average	402	410	474	487	530	552

The following table shows the rate per 1000 of office visits, dispensary calls, of students at four year intervals from 1913-1938:

1913-14	1917-18	1921-22	1925-26	1929-30	1933-34	1937-38
2,946	4,949	5,335	4,041	6,517	11,613	11,893

With each expansion of services, the personnel and machineries involved soon work at capacity, and further expansion becomes necessary. For example, in 1930-1931, a full time mental hygiene unit was established, and during that year 576 students were seen by its staff, the total number of interviews with students being 3,699. In 1937-1938, these numbers were respectively 1,195 and 6,826. Similar increases are seen in other services, including our sensitization tests and work.

Our experiences so far, indicate that the question of what should constitute adequate health-medical service is a difficult one to answer. It appears to be much like education. The more people appreciate the value of health, the more they know about the fundamentals of healthful living and about the importance of scientific health-medical services and care, the more of these services they will want providing the services are accessible.

That people have a long way to go in making provisions for what one might term propitious health-medical care for the young adult age group not attending universities is suggested by mortality statistics. The annual number of student deaths and mortality rate, deaths per 1,000 students, are seen in the following table:

Years	1932-33	1933-34	1934-35	1935-36	1936-37	1937-38
No. of deaths	5	5	2	5	5	7
Mortality rate	.66	.68	.25	.57	.53	.72

The average number of deaths annually during this six year period was under five and the mortality rate averaged .57 per 1000. In the age group generally represented by students (18 to 25 years) for the United States as a whole, the mortality rate is approximately 4 per 1,000. In other words, being a student is one of the least hazardous of occupations. At least, statistics show that each year, in this age group, seven times as many young men and women among those not attending universities die as among those attending universities.

SOCIAL SIGNIFICANCE OF DISEASES AND DISORDERS

From a purely scientific point of view, psittacosis is of as much interest and importance as is tuberculosis. The former, however, has comparatively little social significance while the latter is of outstanding social importance. In traditional medical education, imbued or almost consumed as it is by the scientific spirit, there are not a few instances in which diseases of little social significance are given the same time, attention, and emphasis as are those of great social importance. As a result, medical education often spreads out something like a delta without much variation as to depths, and in many cases young doctors go out into the practice of medicine with little appreciation of the social significance of the various ills of mankind and the relative importance of each. Of course, the scientific attitude and spirit must be encouraged and sustained in medical education. However, the teaching of the relative social significance of diseases and disorders, should go hand in hand with the teaching of scientific medicine.

At any rate, a Student Health Service offers opportunities for study of the social significance of diseases and disorders as measured in terms of morbidity among young adults, an important age period. During the academic year 1937-1938, regular session, 114,408 dispensary calls were made by students to the University of Michigan Health Service. This was a daily average of 552. Here we have a rare opportunity to observe and record the incidence and prevalence of diseases in a community of approximately 10,000 young men and women.

STUDENT HEALTH SERVICE AS RESEARCH AND TEACHING AGENCY

The Student Health Service should not be regarded as a detached unit in a university, a unit wholly concerned with the daily routine of looking after the health-medical needs of students. It can and should participate in research and

teaching. In making this statement I do not have in mind the utilization of ill students for teaching clinical medicine or for clinical research. Only under exceptional, specially arranged and well guarded conditions should this be done. What I have in mind is quite a different matter, it is that investigation and research should be carried on by the Health Service whenever possible, especially in the field of preventive medicine and physiological hygiene, and in epidemiology, with particular reference to direct contact infections. The fact that large groups of young adults may be observed over a period of four or more years under arrangements which encourage them to seek advice early in case they feel below par, affords rare opportunities for studies of the several factors making up physiologic hygiene (focal infections, blood pressure, nutrition, activities—optimum of mental and physical work, mental hygiene, poisons, etc.).

The Student Health Service along with genuine, scientific physical education, which should be correlated with the interests and activities of the Student Health Service, should offer unusual opportunities for the inauguration and development of studies in the science of the human organism—man, in physical and clinical anthropology. The methods of physical anthropology may well be applied to studies of the student group—including heredity, constitutional types and their significance, anthropometry, vital and physical capacity, etc. Research is very much needed in materials and methods of health education; likewise in the field of health-medical administrative practice.

I have already touched on having Student Health Service staff members teach hygiene, public health and preventive medicine. In addition to the actual teaching service rendered, this teaching should do much to hold the interests and activities of the Health Service as much as possible on the first inches of our morbid process yardstick.

Formerly, public health was almost wholly concerned with pathogenic parasites and environmental factors or routes of transmission. The construction and operation of machineries for water purification, sewage treatment and disposal, refuse disposal, pasteurization of milk, food inspection, insect and rodent destruction, etc., made up the consuming interests and activities of public health work and administration. Consequently, the teaching of public health and preventive medicine to medical and to professional public health students, based on this concept of public health, centered on these machineries. The theoretical instruction was supplemented by visits to observe or study the construction and operation of these machineries. The general impression was that public health was made up wholly of environmental interests, activities and machineries.

Now that public health centers more on the human being himself and recognizes that health needs include not only adequate attention to environmental conditions but also to periodic health examinations; prevention, early detection and correction of physical, emotional and mental defects; mental hygiene; nutrition; protective inoculations, etc.—not only is there need for personnel educated and trained for this, but there is need for additional machinery. This new machinery is taking the form of the community health center, wherein the

personnel of public health and preventive medicine, on the one hand, and of curative medicine, on the other, are coming together with a view of working out effective health-medical services for a community. Today, public health and preventive medicine cannot be taught effectively without recourse or access to some such organization or machinery as a community health center, for observation and study of its general set-up and operation.

In a large measure, the Student Health Service may be regarded as a pioneer in the community health center movement. The organization and operation of the Student Health Service, including personnel, equipment, nature of interests, activities and services, needs and capacities for serving a given number and age group, its records, financing, costs and so on, may well be utilized for practical observation work in teaching about what is coming to be known as administrative medicine.

TO SUMMARIZE

Unfortunately, many still think of a Student Health Service as being wholly and exclusively concerned with the diagnosis, treatment and care of illness and injuries among students. While the treatment and care of illness and injuries must be one of its major interests, the Student Health Service program includes many interests and activities in addition to this, grouped under: personal services, sanitation and health education. It bears something of the same relation to the student and the student community that a progressive governmental health department bears to a municipality.

A constructive Student Health Service should participate in the teaching and research functions of a university, particularly in the field of hygiene, public health and preventive medicine, and in community health center interests.

It is important that the medical school see and appreciate the whole picture. Those directly responsible for medical education should be interested in seeing the Student Health Service concern itself as much as possible with preventive medicine—with the first inches of the morbid process yardstick; and in seeing it operate in all its functions. Let me repeat—the objectives of a genuine Student Health Service are: protection, conservation and promotion of health. Its goal is positive health and physical and mental efficiency. These involve interests and activities to which, in my opinion, medical education is going to pay more attention than at present; namely, the study of health and preventive medicine.

Human Health and Its Assessibility*

A Proposal for Its Use in University Health Services and in the Medical Curriculum

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University Health Services are established in universities for the purpose (1) of determining the physical fitness of students; (2) of providing professional medical advice or treatment to sick or injured students and (3) of supervising the sanitation of the university premises and environment. The reason for ascertaining the physical fitness of students is to make certain that they may engage in athletic sports or physical training without any risk of injuring their health, for should they do so, the university authorities might be held responsible. The doctor bases the physical fitness of a student on a physical examination in which a search is made for any evidence of present or past disease or infirmity, and if none is found, the assumption is that the student is physically fit. In the absence of any evidence of changes in the body produced by disease, a state of physical fitness or health is judged to be present.

Health is treated as though it is a negative state, an absence of disease, and the purpose of the examination is essentially to exclude the existence of disease conditions. The same attitude toward health exists in the minds of most practitioners, for they think of those people who are free of symptoms definite enough to indicate the advisability of their consulting a doctor as being healthy, or, if on examination of a person with symptoms they find no evidence of any pathological condition, they conclude that he is free of disease and that, as far as they can see, he is healthy. Evidences of disease in a patient are recorded as positive findings, whereas when the examination reveals no evidence of disease changes, the findings are reported as being negative. Constant repetition of this practice has resulted in the doctor thinking of a person with positive findings as being sick and diseased and of one with negative findings as well and healthy.

Owing to health being conceived as a negative state, an absence of something in a person, the doctor has made no serious effort to study and investigate it in the persons who consult him. Following the examples of their doctors, the public believe that if they have this or that symptom, such as pain, fever, cough and so on, then they have some disease and should go to their doctor; while, on the other hand, if they have no symptoms, they must be healthy. Hence, a doctor's practice consists almost exclusively of sick persons and his experience with the well is practically negligible. As a clinical teacher in a medical school, he instructs students on the methods of diagnosing and treating patients in

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hospital suffering from various diseases. When he was a medical student himself, he learned anatomy and physiology and then had clinical instruction on patients, so that his whole experience from its very beginning as a medical student has been with sick or diseased persons. Thus, each new crop of doctors is trained by those before him and so their education continues to be focused on acquiring the knowledge and capacity to look after the sick.

Although the doctor graduating in medicine today has an infinitely greater understanding of the anatomy and physiology of the human organism than ever before, and has a more genuine scientific point of view in his approach to the investigation of the sick person, he has but few opportunities of applying this greater knowledge of the chemical, physical and physiological activities of the body to assessing the health of a particular person. He should be taught how to investigate the well person scientifically by the same methods as he uses on the sick person.

University health services are recognizing that the purpose of the examination of the student should be enlarged from that of determining physical fitness only, to that of assessing his health in all its aspects. They are undertaking the scientific investigation of well students and estimating the quality and degree of their health. They have become convinced that health is a positive state, one that can be measured, that can be maintained and that can be improved in the individual student. "No longer is our conception of health limited to mere absence of illness, nor are its problems confined to the physician's office. In our present view," continues Livingston Farrand, in the Proceedings of the Second National Conference on College Hygiene held in Washington in December, 1936, "health is a condition of well being, which embraces physical, mental and emotional hygiene and controls, to a very large extent, personal and social behavior. It is thus recognized as having a much broader foundation than that of physical fitness alone."

The conception of health as positive necessarily results in University Health Services expanding the functions for which they were originally established. The object of the doctor's examination of the student, instead of determining his fitness for physical activity only, assesses the degree and quality of his health and his fitness to live the life of a student in the university. A history is taken of his health from birth to the age he is, in addition to that of the diseases or injuries he may have had, and an examination is made of the quality and efficiency of his structures and their functions and of his personality, mentality and emotional hygiene. From the findings in the history and examination, an assessment is made of the student's health from all standpoints and a decision is reached as to his capacity to undertake the physical, intellectual and social activities of a student in the university.

Health education has long been recognized as an objective in general education. The knowledge of the student of the composition and functioning of his body has been most elementary and inadequate, so it is the responsibility of the University Health Service to provide a course of instruction on the living

human body, its health and how this can be maintained and promoted. The object of the instruction given to all students in the university should be to provide them with a knowledge of (1) life and living things and the parts that their inherent life activities, their heredity and reproduction and their environment play in the maintenance of their health; (2) the human organism, its structures, functions and personality; its growth and development; the parts that its inherent life activities play in the maintenance of its health in the various environments in which it lives; (3) the factors that influence the maintenance and promotion of health in the individual person in infancy, childhood, adolescence, manhood and old age; (4) the means that are used for the promotion of community health; the means used for the prevention of disease.

Scientific research in the fundamental medical sciences has added enormously to our knowledge of the structures and functions of the human being. Clinical science and clinical investigation have, likewise, made great additions to our understanding of sick persons and disease—its causes, diagnosis, treatment and prevention. Disease and the sick person have been subjected to many scientific studies and investigations, but health and the healthy person have not, as yet, been the object of research to any appreciable extent. "The practice of medicine," writes Lewis H. Weed in "The Anatomist in Medical Education"[1] "is still essentially an art, but alongside of this art, an appreciable body of scientific fact in human and mammalian biology has accumulated and is continuing rapidly to accumulate. As biological information relating to man is in the future assembled through the efforts of geneticists, biometrists, anthropologists, anatomists, physiologists, chemists and others, (among which I would add doctors in health services of universities, schools and genuine health clinics—E. S. R.), medicine will stand forth not only as a curative and preventive art, but as a great division of human biology." A further function, therefore, of University Health Services should be the prosecution of research studies into the many unsolved problems concerning the health of the individual person of the student age period.

"Those who take a longer view," writes the Editor of *Nature,* "will realize that it is not merely 'student health' as such which is to be aimed at, but—through the universities—the intelligent and conscious application of a new biological outlook on human beings, an outlook intended ultimately to affect the entire community. Health is a positive thing, namely, living up to the best powers of the individual. It is not merely absence of obvious diagnosable disease." . . . "To recognize disease, or minor ailments, or chronic under-nutrition, or mental trouble, or anything lowering the level of happiness, fitness and usefulness in university students and to provide means of improvement, are important enough. Even more important, however, in the long run is to send out steadily into the community a stream of intelligent and keen young people who have learned, even in a minor way, what a health service can do for them and their friends, and how necessary it is to the happiness and well-being of the people."

"Physiological and general medical knowledge is far from being generally

1. J. Assc. A. M. C. 14:281-291 (Sept.), 1939.

applied. Doctors might play a far greater part than they ordinarily do play in spreading that knowledge and insisting on its application. If all doctors were adequately trained in preventive medicine, and in what may be called personal or individual hygiene, and if they had a well-developed sense of community responsibility, the family doctor would be the ideal instrument for furthering, by direct education, the cause of individual health."[2]

The University Health Services would, of course, continue their functions of providing professional medical services for the sick and injured students and of supervising the sanitation of the university.

The clientele of the University Health Service consists of healthy persons, on the principle that health is a positive state that can be assessed and can be influenced by advice or treatment; the practice of medicine consists of sick persons, on the principle that disease is a positive state that can be assessed and can be influenced by treatment. In each instance, the principle is sound, but tradition, the philosophy of their education and experience, have resulted in the medical profession conducting its practice almost entirely on the latter principle. It is suggested that medical faculties follow the example of University Health Services by recognizing the assessibility of health in a person and revise the curriculum of medical education in accordance with this new point of view.

It is claimed by some doctors that health is now taught in the course in physiology, which is quite true, up to a certain point. The same argument might be applied to pathology by stating that disease is taught in this subject. Just as the application of the principles of the science of disease is taught to the student on sick persons, so should the application of the principles of the science of health be taught to the student on well persons. Health is essentially a personal thing, a state of each individual, and a doctor should know how to assess it and how to help the individual to bring about its improvement. Its presence is the most valuable protection against disease and its loss is often the first indication of the onset of disease. The doctors of the future should be so educated that they will be health advisers as well as sickness curers and disease preventers.

Sir George Newman[3] says, "There is, for the first time, an indication of the shifting of the center of gravity of medical education from the study of disease to the study of human health, as the primary business of the student. He is to study normal living anatomy and normal living physiology; and in both there are to be included genetics (heredity, variation, Mendelism, sexual reproduction, breeding and inbreeding, racial characteristics) and the elements of normal psychology (intellect, will, emotion, and their relations to disease). His starting point for a medical course is to be not disease but health. It is a significant reform. That there may be no misapprehension on this point the Council have declared that—

"(1) Throughout the whole period of study the attention of the student

2. Roberts, Harry: New Statesman and Nation.
3. Chapter on "The New Spirit in English Medical Education." 'The Building of a Nation's Health', September, 1939.

should be directed by his teachers (a) to the importance of the measures by which normal health may be assessed and maintained, and (b) to the principles and practice of the prevention of disease;

"(2) Health rather than disease has become the primary objective of the student at the commencement and 'throughout the whole period of his study.' Why is this? Because health is the normal, and deviation from it is the beginning of the abnormal. He must first know what health is, how it is to be measured, how secured, how maintained, before he is in a position to understand disease, or before he can endeavor to bring his patient back to health. . . . Twenty years ago the medical curriculum in all civilized states was centered in the study of morbidity; today the basic line is physiological. Disease is a reaction from that standard, due to innate defect or the impress of heredity, environment or infection."

Just as the signs and symptoms of disease are manifested in the sick person, the patient, so are the signs and symptoms of health manifested in the well person. The teaching of the signs and symptoms of disease constitutes clinical instruction on the patient in the hospital. The same kind of instruction should be carried out on the well person as a means for the student to acquire an understanding of the signs and symptoms of health. The students themselves might act as examinees for this purpose, each one examining a number of his fellows so that he may appreciate the variations that exist within the range of health. The standard methods of physical examination, viz., inspection, palpation, percussion, auscultation and testing of functions, can be applied to the well person with the purposeful intention of determining the quality of health of the part examined and the efficiency of its functions. For example, on the completion of the theoretical and practical instruction on the upper extremity in anatomy, the student might be taught to carry out a health examination, having as its objective an estimation of the quality of the health and the efficiency of the functions of the skin, of the subcutaneous tissue, of the muscles, the bones, the joints, of the arterial, venous and capillary circulation, of the sensory and motor nerves and of the effectiveness with which the arm and hand of the particular person perform their usual functions. Instruction on each part of the body might be conducted along similar lines.

The same procedure might be followed in the divisions of the course in physiology, so that, for example, the student would learn the findings characteristic of the healthy heart and healthy lungs by examining these in well persons. "Physiological science, and the art of medicine, as practiced by the ordinary doctor, are not yet closely related. . . . In so far as this rather caustic criticism is well founded, it certainly points to grave defects in our medical education. It suggests that we doctors have not been trained to apply in practice the mass of relevant physiological and hygienic knowledge now at our disposal. Applied physiology and applied psychology might with advantage occupy half the time of the student's life now given up to memorizing for examination purposes minute anatomical details likely to be of little or no practical value to any but

the specialist surgeon. In any case, they are forgotten within a few months after the examination."[4]

The courses in "physical diagnosis" or "diagnostic methods" now given on the completion of the anatomy, physiology and psychobiology courses are devised to teach the students the methods to be used in the examination of a person as a means of diagnosing the disease condition from which he may be suffering. The procedures to be followed in the making of a physical examination of the heart, lungs and abdomen are particularly stressed. The student learns how to carry out inspection, palpation, percussion, auscultation and other special methods of examination and the significance of the interpretation of the findings in the determination whether or not the part examined is "normal" or "abnormal." If the findings are such that they are interpreted as "abnormal," then the part or organ is considered to be affected by this, that or the other disease. If, on the other hand, the findings are interpreted as "normal," the part or organ is assumed to have no disease present and is thus "healthy." Most attention is paid to teaching the signs that are to be found in the common diseases of the heart, lungs and abdomen and their significance. The whole focus of the course is on the methods of diagnosis of disease. It is suggested that the center of gravity of the course should be shifted so that the methods of diagnosis of health are taught in the first place and those of disease afterward.

Instead of the findings being interpreted as "normal" or showing a freedom from disease, they should be interpreted in terms of the quality of the health of the part or organ and of the degree of efficiency with which it is performing its functions. If this were done and the student taught how to diagnose the signs of health in the well person in the above manner, before he is taught how to diagnose the signs of disease in the sick person, he should be better prepared to undertake the work in the clinical years than after the present type of course.

Quite reasonably it might be asked where doctors with experience in the diagnosis of health could be found to give instruction of the proposed kind. The members of the staff of the University Health Service who examine and assess the health of the whole student body and thus gain valuable experience in health diagnosis, should be capable of instructing students in medicine in such a course and also in the courses of anatomy and physiology.

At the present time no textbooks are available which adequately portray the application of anatomy and physiology to the health of the individual person or describe its methods of diagnosis. The opportunity to write such a textbook is open to some one who can describe accurately and convincingly the signs, symptoms and manifestations of health in the well person and the interpretation of the relation of these to the structures and the functions of the body. Such a book might be written somewhat along the same lines as Boyd has followed in his books on pathology. The pathological changes in the various tissues and organs produced by disease are shown to have a definite relationship to the signs and

4. Roberts, Harry: The Progress of Medical Science. The New Statesman and Nation, Sept. 9, 1939.

symptoms of disease which are revealed in the history and examination of the patient. Just as an understanding of the manifestations of disease can be gained from the study of their relation to pathological changes in structure and function, so can an understanding of the manifestations of health in a person be obtained from the study of their relation to the anatomical structure and physiological functions of the body. A golden opportunity awaits the man who undertakes this task.

SUMMARY

The present purpose of University Health Services is to determine the fitness of students for physical activities, freedom from disease or infirmity being the basis on which a decision is reached. The doctor's conception of health as an absence of disease has developed from the medical education he has received and the experience he has had in practice. Even today the doctor has little opportunity to observe the application of his medical knowledge on healthy people.

University Health Services are recognizing that health is a positive state of the human organism having a much broader foundation than that of physical fitness alone, the result being that the examination of the student is made with the object of determining his fitness from the standpoint of health for the academic, physical and social activities in the university.

Health education of the whole student body is a responsibility of the Health Service. A further function is the prosecution of research in problems of health of persons of the student age period.

Medical faculties should recognize the principle of the assessibility of health as has been done by the Health Service and should revise their medical curriculum in accordance with this new point of view. "The center of gravity of medical education is shifting from the study of disease to the study of human health, as the primary business of the student." (Newman).

The signs and symptoms of health in a well person should be taught to the student in the same manner as the signs and symptoms of disease in the sick person are now taught. The quality of the health of the structures of the human body and the efficiency with which their functions are performed should be taught to the student in anatomy and physiology and health diagnosis of the individual person as a whole in a course corresponding to the present one in physical diagnosis.

The Dartmouth College Health Service*

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Dartmouth College is located at Hanover, New Hampshire, a town with a permanent population of 3,500 which is 140 miles from Boston and 190 miles from Montreal. The College and its associated schools of Medicine, Business and Engineering have a total annual enrollment of approximately 2,450 men.

The comparative medical isolation of Dartmouth College necessitated the development of a system of medical care which could function independently of outside assistance. A number of factors have contributed to make this possible.

Dick Hall's House, the College Health Center, is the gift of Mr. and Mrs. Edward K. Hall, in memory of their son Dick who died while a student in College. Its normal bed capacity of forty, which includes an isolation floor, has, in times of need, been expanded to sixty-nine. Dick Hall's House combines modern hospital construction and equipment with the spaciousness and atmosphere of a luxurious home. It has a well stocked and much used library, adequate outpatient offices, lounges designed for the ambulatory convalescent patient and rooms planned for the parents of boys critically ill.

Dick Hall's House is physically connected by a closed corridor to the Mary Hitchcock Memorial Hospital and this connection facilitates the use of the hospital operating rooms, laboratories, x-ray equipment and kitchen.

The Mary Hitchcock Memorial Hospital, with its 154 beds, is the medical center for a rural area some 80 miles in length and 40 miles across. This hospital, approved by the American College of Surgeons, and by the American Medical Association for internships and for residencies in x-ray and pathology, has a necropsy record of 84.6 per cent. It has a school for medical technicians approved by the American Medical Association and the American Society of Clinical Pathology. Only a small proportion of the total patient days, 39,367, represents Hanover patients, the balance being the result of cases referred by physicians in the surrounding communities which do not have comparable facilities for hospital care.

The members of the professional staff of the Mary Hitchcock Memorial Hospital also serve as the staff of Dick Hall's House. In addition, these men hold teaching appointments on the faculty of the Dartmouth Medical School.

On November 7, 1935, President Hopkins appointed a committee to survey the health organization of Dartmouth College, to investigate possibilities for making the facilities and services of greater value to the undergraduate student body, and to make recommendations for desirable changes.

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*Read at the Fiftieth Annual Meeting of the Association of American Medical Colleges, held in Cincinnati, Ohio, October 23-25, 1939.

In brief, the Health Survey Committee found that the Health Service of the College was made up of six independently functioning units: The Medical Director's Office; The Department of Physical Education; The Dartmouth Medical School; Dick Hall's House; The Mary Hitchcock Memorial Hospital and the Hitchcock Clinic. Each unit was found to be performing a valuable service, but the lack of any planned coordination was evident.

Analysis of the financial picture then existing showed that $32,000 was being expended annually by students for professional fees and hospitalization. Almost an equal amount, $28,000, was contributed by the College in the form of cash to cover such items as salaries, physical examinations and the deficit incurred by the College in running Dick Hall's House. Combining these figures, it was found that $25 was spent for the health of each student annually.

By use of a questionnaire, the Health Survey Committee learned that only 282 individuals professed to consult doctors promptly in the event of illness, whereas 806 denied that they did so. Among the reasons given for failure to seek the advice of a doctor in case of illness, 394 men mentioned their reluctance to incur the expense of professional advice and 624 men feared incurring hospital expense. Three hundred and eighty students admitted that they consulted a doctor less promptly after having been in residence at Dartmouth for a period of one year.

Through the same questionnaire it was found that during a German measles epidemic in the winter and spring of 1935, 204 students admitted having the disease and an additional thirty-three men admitted having some minor illness. Of the total number, 237, only 176 consulted a physician.

After determining these and other facts, the Health Survey Committee concluded, "The weaknesses existent in the present Health Service relate directly to the fact that the student must incur a charge whenever he seeks medical advice at Dick's House or at the Hitchcock Clinic." This unwillingness to seek proper medical care bore no direct relation to the financial resources of the individual.

Investigation of health organizations in operation in other colleges and universities, some privately operated and some classified as state institutions, showed a "definite and rapid development of plans to provide unified health services." In most institutions a health service fee was levied on each student but some included that fee in the regular tuition charge.

The report of the Health Survey Committee led to the appointment by the President of the Committee on the Organization of Student Health. This committee, in turn, recommended the plan which subsequently was approved by the President and members of the Board of Trustees of Dartmouth College and has been in operation for the past three years.

COUNCIL ON STUDENT HEALTH

The plan, as adopted, provided for a "Council on Student Health" consisting of representatives from departments of the College concerned with the health program. The Health Council is appointed annually and is responsible to

the Board of Trustees through the President. This council has power to supervise the Health Service of the College, including health education, sanitary control, physical examinations and care of the sick both by outpatient service and hospitalization.

The Health Service is operated by the Medical Staff of Dick's House under the supervision of the Health Council. The duties of the staff include certification for admission or readmission, entrance physical examination, with subsequent classification of student eligibility for participation in recreational activities and organized sports, operation of the outpatient department, open four hours per day (1 morning, 2 afternoon, 1 evening hours) where students are seen and treated for medical, surgical and psychiatric complaints, and operation of the inpatient service which provides medical and surgical care and complete hospitalization with the exception of such items as private nursing care, special medication and consultation by physician other than those on the staff of Dick's House.

The Health Service provides for the care of all accidents occurring or illness arising during the College year among the students of Dartmouth College and its associated schools. The maximum period of hospitalization is five weeks per semester. This service does not apply to students away from Hanover except those officially representing the College.

In order that medical care and hospitalization should be made available to all students and, so far as possible, be disassociated from immediate expense, the Trustees of the College inaugurated an increase in tuition in preference to establishing a health fee. The tuition in Dartmouth College is $450.00.

Under the plan outlined above, the Health Service has been in operation over a period of three years. It is my intention to summarize briefly the work done during that time, and its actual cost and, finally, to point out certain definite statistics which indicate that the present Health Service has done much to abolish those conditions which originally made its organization seem advisable.

FUNCTIONING OF HEALTH SERVICE

Since the initiation of the Dartmouth College Health Service each student entering the College or its graduate schools has been subjected to a thorough general physical examination, which included special examinations by an ophthalmologist and otorhinolaryngologist, a Wassermann test, a urinalysis and a paper x-ray film of his chest. It should also be mentioned that stool examinations have been made for the detection of *Endamoeba hystolitica* and other intestinal parasites. This stool examination was instituted originally as a research project and its results will be referred to later in this paper.

Following these examinations and tests, the findings, together with the past history furnished by the family physician, are reviewed. Those students who have conditions making it advisable, are declared ineligible for activities which might injure them. Those having chronic conditions, such as heart, lung or kidney disease or diabetes are assigned to the staff member best suited to care for them. A required course in hygiene is included in the curriculum of the

freshman year. Special gymnasium classes are organized to correct defects of individuals and to supervise and grade the activity of those recovering from illness or injury. Psychiatric diagnosis and treatment is carried out by a full time psychiatrist and neurologist.

Since it does not fall within the scope of this paper, I am omitting any comprehensive statistical report of disease. Table 1 illustrates how extensively the Health Service is being used.

TABLE 1. HEALTH SERVICE

	1933-34	1934-35	1935-36	1936-37	1937-38	1938-39
Outpatient visits	*	*	*	9366	9721	9672
Inpatient days	2447	3851	3609	6529	5724	7017
Operations	52	55	79	97	85	120
Deaths	2	1	1	0	0	1
No. students	2423	2480	2460	2430	2442	2473

*no figures available

A glance at this table shows that there are at least two striking differences between the two three-year periods before and after the present Health Service was organized. In the first place, the number of hospital days has been more than doubled under the present system. In the second place, although the mortality statistics are small during both periods, it is suggestive that four deaths occurred during the three year period before the Health Service was organized as opposed to the one death that occurred during the first three years of its operation.

Table 2 presents a summary of the financial record of the Dartmouth College Health Service during its first three years of operation.

TABLE 2. DARTMOUTH COLLEGE HEALTH SERVICE

	1936-37	1937-38	1938-39
Professional and Supervisory Services	$39,544.70	$43,139.55	$42,313.38
Printing, Supplies, Postage, Telephone	2,884.64	2,003.98	2,883.52
Dick Hall's House	11,740.43	11,733.49	12,999.50
Nursing, Medical, Board, Laundry, etc.	23,645.35	20,325.66	25,079.04
Hospital Services	8,290.54	7,993.21	8,993.72
Examinations and Outside Care	1,601.67	1,175.34	1,601.90
Sundry Advances	1,190.28	879.69	1,296.23
Other Expense	157.57	85.26	154.87
Total Expense	$89,055.18	$87,339.13	$95,239.26
Income	11,327.18	8,300.13	11,093.26
Net Expense	77,728.00	79,039.00	84,146.00
Annual net cost per student	$ 31.99	$ 32.37	$ 34.03

Having outlined the events which led up to the organization of the present Dartmouth College Health Service, and having summarized its actual operation and costs during its first three years, I want to point out certain objective changes which have occurred following its institution and comment on those changes.

In spite of the fact that there has been relatively little change in the enrolment figures of Dartmouth College and its associated graduate schools during the past six years, the days of hospitalization jumped abruptly more than 100 per cent when the present form of Health Service was put into operation. It is safe to assume that this change does not represent an increase in morbidity. Instead, it reflects an increased willingness of the student to seek professional and hospital care when needed.

In support of this statement are the statistics derived from the studies of the records of pneumonia and appendicitis cases before and after the Health Service was organized.

In the school year 1935-1936 a diagnosis of appendicitis was made in 23 cases. The average interval elapsing between the onset of first symptom and first visit to a doctor was 53 hours. In the year 1938-1939 when 19 cases occurred the interval was 35 hours.

In the case of pneumonia occurring in the same two school years the picture was much the same. In 1935-1936 a diagnosis of pneumonia, substantiated by x-ray, was made 18 times, and the average case did not consult a physician until 60 hours after the onset of his symptoms. In 1938-1939, the symptom interval in 36 cases was reduced to 30 hours.

These studies, of course, include some cases in which the onset was rather mild and gradual rather than severe and abrupt, but I feel that there is relatively little room for discussion regarding the advisability and value of early medical treatment whether the case of pneumonia or appendicitis is a slowly progressing or a rapidly fulminating one.

In a review of the minor respiratory diseases, colds, influenza and bronchitis were grouped together. In 1935-1936 those diagnoses were made 188 times as opposed to the year 1938-1939 when the number of cases was 529. It is quite evident that the present Health Service is seeing and treating a greater proportion of the cases of minor respiratory diseases which, formerly, were self-treated in the dormitory and classroom.

CONCLUSIONS

The danger of drawing conclusions from statistical data is always present but the figures submitted above would appear to have definite significance and support my thesis that our present approach to the student health problem is a valuable and workable one if we are interested in seeing treatable diseases in an early stage.

"Blind routine" diagnostic procedures always afford ample room for discussion. The routine physical examination and urinalysis have established their worth beyond any doubt in the eyes of the modern medical man. Our routine blood serology test revealed two positives during the two years it has been made.

In the past four years, a survey of students of Dartmouth College for amebiasis has been made by Frank H. Connell, Ph.D. and Harry T. French, M.D. Their findings have been reported.[1] Thirty-seven of 2,750 students examined were found to be infected with *Endamoeba histolytica.* Only eight of the 37 had had symptoms severe enough to cause them to consult a physician. Treatment with emetine and carbarsone was universally successful in eliminating the parasites and the individuals treated reported subjective improvement. Since adequate stool examinations for amebiasis require much time and money, we

1. J.A.M.A. 113:649-653, 1939.

have not adopted it as a routine procedure and plan, instead, to study only those students having suggestive symptoms and those students engaged as food handlers.

The chest x-ray studies have revealed only a small number of cases of significant pulmonary pathology—1 lung cyst; 1 case of active tuberculosis, and a number of cases with calcified tuberculous lesions.

In the past three years, 229 students have had 834 psychiatric interviews and 17 students have been dropped from college because of serious mental illness.

This summary of the present Dartmouth College Health Service is being reported not as the ultimate ideal but as one which is measurably better than its predecessor, largely because, in the mind of the student, it has eliminated the financial barrier which in the past separated him from needed medical and hospital care.

Tuberculosis Prevention, Immunization and Periodic Health Examinations Among Medical Students*

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Recently I received two letters from former students of our Medical School. One of these students had been dropped from school for failure to pass the comprehensive examination of the sophomore year and is now engaged in business. The other one is serving an internship in a hospital in a distant city. Both of these letters urged that the Medical School do everything in its power to safeguard the health of its students. Doubtless, it was because of similar concern among the members of the Executive Council of this Association that this program was arranged.

The other speakers on this symposium have excellently presented the reasons why every medical school should have a first-class health service program for its students and they have outlined the major activities which should be included in such programs. Consequently, I shall refrain from discussing further the general principles involved, although after having spent fifteen years as director of a students' health service, it is difficult for me to pass up an opportunity such as this affords. I am assuming, therefore, that you are convinced as to the necessity of maintaining adequate health service programs for your students, and so will limit my remarks to three important practical aspects of such health programs. These aspects are periodic health examinations, immunizations and tuberculosis control.

PERIODIC HEALTH EXAMINATIONS

Periodic health examinations constitute one of the cornerstones of modern preventive medicine. We talk to medical students about their importance and hope that they will learn how to perform them. How empty, however, all this must seem if we ourselves make no effort to carry out the practice which we advocate. At a conference held several years ago on the conduct of periodic health examinations, one of the speakers embarrassed his audience by asking for a show of hands of all those who had had physical examinations during the past year. Before this audience such a question would be impertinent, for I am certain that no one in this group would neglect such an important health measure. The students, however, may not be so sure of this as I am, particularly if no arrangements are made to provide them with similar examinations. Certainly, we can

*Read at the Fiftieth Annual Meeting of the Association of American Medical Colleges, held in Cincinnati, Ohio, October 23-25, 1939.

expect the students to take what they hear and read about the importance of periodic health examinations with many "grains of salt" if the faculties of our Medical School evince no interest in them.

At the University of Minnesota we began giving thorough annual periodic health examinations to all medical students in 1927. The first year that these examinations were required it was considered purely as an experiment. Each medical student received a notice from the Dean's office that he was required to report to the Students' Health Service on a certain date and hour for a physical examination. Medical students resent most new requirements, and many objected strenuously to this one because at that time, our Students' Health Service was on the "academic campus," several blocks away from the Medical School, and, consequently, more or less looked down on by the hierarchy of medicine. Finally, however, with more or less reluctance, all of the students took the examinations. To perform these examinations, the Health Service selected the most competent examiners available. An hour's time was allowed for each examination, in addition to the time required for filling out the history blank and for the performance of laboratory tests. X-ray examinations of the chest were routine, and every possible effort was made to have the examinations done carefully and thoroughly and the health advice given skillfully. After these examinations were completed, a questionnaire was sent to each medical student with a note stating that these examinations had been conducted as an experiment without any plans for their continuation and asking that he reply to several questions concerning his reactions to the examination. One of these questions was, "Do you think similar examinations should be required of medical students? If so, how frequently?" Much to our surprise 95 per cent of the students recommended that examinations be required each year of the medical course. On the basis of this expression from the students, annual examinations were made a routine procedure the following year. The highest possible standards for the conduct of these examinations have been maintained, and if they were to be discontinued now, I am certain that the students would protest strenuously. Each year these examinations discover many physical defects and health deficiencies which should be corrected among the medical students; but I consider their educational value to be of as great or even greater importance than the direct health benefits which result. On the basis of our experience, it seems to us that the most effective method of instructing medical students concerning periodic health examinations is to have them experience at least four such well conducted examinations during their medical school years.

IMMUNIZATION OF MEDICAL STUDENTS

The immunization of medical students constitutes the second aspect of the health service program which I want to consider. Presumably, all medical students are instructed concerning the immunizations which are of established value and of practical usefulness. Presumably, also, medical students should keep up their own immunity against those diseases for which effective immunizations are available and to which they are most likely to be exposed. Actually,

however, few students even know whether or not they are immune to these diseases unless provisions are made for providing them with this information.

With immunizations, as with periodic health examinations, it has seemed to us most illogical to be teaching our students about their importance and then doing nothing about them, particularly when they will be exposed to many contagious diseases during their clinics and internships. With this in mind, we have been requiring the medical students at Minnesota to be immunized against smallpox during the freshman year, against diphtheria during the sophomore year, against scarlet fever during the junior year and against typhoid fever during the senior year. All or practically all medical students already have been vaccinated against smallpox, but it is well for them to be revaccinated. If they have a high grade immunity, they will get only an immune reaction; if not, they will get a modified "take" which will again raise the level of their immunity.

Diphtheria is one of the serious communicable diseases to which medical students and interns will be exposed. Not long ago, over a period of two years, two of our senior medical students and six of our students who were on internships contracted diphtheria. The practice which we now follow is to apply the Schick test as part of the physical examination of sophomore students and to immunize with toxoid all who are shown to be susceptible to diphtheria.

Scarlet fever is another disease to which senior students and interns will be exposed. According to replies to a questionnaire from graduates of our Medical School from 1919 to 1936, the three most serious illnesses, other than tuberculosis, which they experienced since graduation were pneumonia, appendicitis and scarlet fever. Our current practice is to include the Dick test in the physical examination given in the junior year and to immunize with scarlet fever toxin those who react positively to the test.

Typhoid fever is no longer prevalent in this country, but hospital personnel, as well as members of the army and navy should be immunized against it. We vaccinate our medical students against typhoid fever during their senior year. This immunization program which we have followed for a number of years we believe is not only a sound health measure for the students themselves, but also the most effective education we could give them concerning the immunization of others when they get into practice.

TUBERCULOSIS CONTROL AMONG MEDICAL STUDENTS

The third point which I wish to present for your special consideration concerns the most serious health problem of medical students, namely tuberculosis. More than one hundred years ago, Armstrong,[1] in England, wrote: "When young men enter upon the study of medicine, they occasionally break up their general strength by the intensity of their applications in the dissecting rooms, in the tainted air of a hospital, or in their own apartments, and may actually become consumptive from this source." Many times before and since that time, writers have called attention to the special liability of physicians to this disease.

1. Armstrong, John: Practical illustrations of the scarlet fever, measles, pulmonary consumption and chronic diseases. London, 1818, pp. 223 and 246.

In the early days, factors such as overwork, bad air et cetera, were considered responsible, but as the epidemiology of tuberculosis came to be understood, these ideas were replaced by an appreciation of the risk involved in the exposure of medical students and other hospital personnel to active cases of this disease.

In 1934, Chadwick[2] wrote: "There is a much higher incidence of tuberculosis among nurses, medical students and doctors during their first years of practice than in the general population."

Of the situation in the Medical School of the University of Pennsylvania Lees[3] says: "The problem of tuberculosis among medical students has been given special study and consideration during the past three years by a faculty committee appointed by Dean Pepper. The prevalence of the disease among our students of medicine has been significantly greater than that encountered in students of other schools on the campus. Moreover, the development of new lesions has been observed in members of the third and fourth year classes. The distribution of cases in the clinical years of training as contrasted with the non-clinical years, approximately eight to one, has followed much the same pattern during the past five years."

Soper[4] of Yale and Amberson of Bellevue Hospital stated, approximately a year ago, in summarizing a study of tuberculosis among students of medicine, that "Medical students are, as a rule, less rapidly and less certainly infected than pupil nurses, but they still acquire infection to an excessive degree. The morbidity among them appears to vary. It seems alarmingly high in a few instances, but not in the majority of schools whose figures are known. Many of the leading schools have already instituted programs of case finding. . . . The mortality seems not unduly high, probably because the cases developing are apt to be diagnosed and treated early."

The nature of tuberculosis is such that any conclusive statement about it must be based on a period of observation long enough to include its complete evolution, which is the span of life. Therefore, the only way to determine the seriousness of the problem with any degree of accuracy is to start with the students as they enter the School of Medicine and follow them throughout life.

At the University of Minnesota we have been studying tuberculosis among medical students for a considerable number of years, and during the past year we have attempted to obtain information concerning its development among the 1,894 students who were graduated from the School of Medicine from 1919 to 1936 inclusive. Although we knew of a number of individuals who had developed clinical tuberculosis during their student years, or subsequently, we did not have a complete picture of the situation. Therefore, we mailed a questionnaire to those students who were graduated or should have been graduated during this period.

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2. Chadwick, Henry D.: Tuberculosis as it affects the general hospital. Bull. Amer. Hospital Assn., April, 1934.
3. Lees, H. D.: Personal communication.
4. Soper, W. B. and Amberson, J. Burns: Pulmonary tuberculosis in young adults, particularly among medical students and nurses. Trans. Cong. Amer. Phys. & Surg., 1938, p. 17.

The information received showed that thirty-five of the group had died of non-tuberculous conditions. Of the others, replies to our questionnaire were received from 1,673 or 90 per cent. Of these, five reported having had clinical tuberculosis before entering college, 60 (3.6 per cent) developed clinical tuberculosis while in medical school and 47 (2.9 per cent) developed it subsequent to graduation. In other words, 107 students, approximately one complete class of medical students, have been ill with clinical tuberculosis during this period of seventeen years. Eleven have died from this disease. This represents approximately one-fourth of the total of forty-six deaths which have occurred in the group.

Significant as this is, it is obviously not the complete picture of the development of tuberculosis which may have been contracted by this group during their student or intern years. There is often a long period between the development of the primary tuberculosis complex of the first infection and the development of clinical tuberculosis of the reinfection type. Thus, a student may be infected with tubercle bacilli in line of duty but there may be no external manifestations leading one even to suspect clinical tuberculosis for many years. The following two cases are good examples:

A sophomore, aged 23, in the School of Medicine, reacted negatively to the tuberculin test in November, 1927, and again in the spring of 1929, just before he began working in a service for tuberculous patients. No further tests were administered until July, 1933, when a definitely positive reaction was present. At this time, a roentgenogram revealed no evidence of disease. Numerous films made subsequently showed no definitely abnormal shadows until May, 1934, when there was an area of infiltration present in the upper lobe of the right lung. No change in this was observed until June, 1935, when an improvement was noted in the area of infiltration in the upper lobe of the right lung, but a small area of infiltration had appeared in the upper lobe of the left lung. In November, 1935, there was evidence of infiltration throughout the entire upper lobe on the left side, and the infiltration in the upper lobe of the right lung had increased. In January, 1936, no further change was noted in the x-ray shadows, but in February there was an increase in the extent of the shadows in the left lung, and tubercle bacilli were present in the sputum. Artificial pneumothorax was instituted; he became a strict bed patient. Later, he developed severe gastrointestinal symptoms; tuberculosis of the left knee joint, and died of generalized miliary tuberculosis in May, 1939. Thus, a period of approximately ten years elapsed between the development of the primary tuberculosis complex and death from clinical tuberculosis.

In February, 1930, a junior, aged 23, in the School of Medicine showed a negative reaction to the tuberculin test and roentgenograms showed no evidence of disease. In February, 1931, the reaction to the tuberculin test was positive after he had been working on a service for tuberculous patients from January 5 to 16. Roentgenograms of the chest at this time were negative. In June, 1932, there was a large pleural effusion on the right side. When the effusion absorbed, there was evidence of a small infiltration in the third interspace on the right side

near the periphery. No further symptoms developed until November, 1933, when a profuse pulmonary hemorrhage occurred, followed by massive atelectasis of the left lung. When the atelectasis disappeared, there was evidence of a large area of tuberculous pneumonia, which was treated by artificial pneumothorax. Later empyema developed, and after this had become sufficiently chronic, thoracoplasty was recommended. On January 17, 1936, fatal pulmonary hemorrhage occurred before thoracoplasty had been attempted. In this case, five years were required for the disease to evolve through all of its stages.

Beginning with the class entering in 1929, and for each succeeding class, the tuberculin test has been administered routinely as the first step in the diagnosis of tuberculosis. Those students who react to the test on admission are usually not retested, while those who do not react to tuberculin are retested periodically throughout the medical course. Thus, we know the number who already had developed the primary tuberculosis complex before entrance to the Medical School and we learn with a reasonable degree of promptness when others develop the primary complex while in school. The x-ray film is used to examine the lungs of all those who react to tuberculin either on entrance or subsequently and this phase of the examination is repeated periodically for all reactors. Those in whom the x-ray film examination reveals any evidence of disease are immediately examined by other means to determine whether the shadows are due to tuberculous or to nontuberculous lesions, and if they are due to tuberculosis, whether the disease is of the first infection or of the reinfection type; if of the reinfection type, whether it is progressive, contagious, et cetera. In this connection, it is significant to note that the examination of the material obtained by gastric lavage of forty-five students, who were entirely without symptoms but whose routine x-rays showed parenchymal shadows, revealed the presence of tubercle bacilli in fourteen instances, or 21 per cent of the total.

The fact has been well established that when a typical tuberculin reaction is present, there usually has developed a primary focus of infection with tubercle bacilli with involvement of the regional lymph nodes. Together these constitute the primary tuberculosis complex. The lesions of such a complex may be in any part of the body; in fact, it has been found that in approximately 5 per cent of persons with such lesions, the lungs are free from involvement. These lesions may be extremely small, not larger than the head of a pin or even microscopic in size and yet render the tissues as sensitive to tuberculin as larger lesions. Thus, one would not expect to locate primary tuberculous foci in the human body during life by physical or x-ray examination except in a small percentage of cases.

The group of graduates studied in the above manner consisted of 453 students who entered the School from 1929 to 1932 inclusive and were graduated from 1933 to 1936. Among these 453 students, 35.6 per cent, had developed the primary tuberculosis complex as manifested by the tuberculin test before entering the School of Medicine. By the end of the third year 41 per cent reacted to tuberculin and at the end of the fourth year, 67 per cent. Thus, 145, or 50 per cent, of those who were nonreactors to tuberculin on entrance became reactors before graduation.

From the questionnaire which was sent to the physicians in this group, we learned that four had died of nontuberculous conditions. Of the remaining 449, replies were received from 369. One hundred and two were from physicians who did not react to tuberculin at the end of the senior year, 65 of whom have had tuberculin tests since graduation. Of these, 30 (46 per cent) became reactors as interns; and 15 (23 per cent) became reactors following their internships. The remaining 31 per cent are still nonreactors.

Students in the College of Education provided us with a control group, since they were reared in the same general section of the country and while in school lived in the same general environment as the students of medicine but were not in direct contact with tuberculous patients as a part of their work. On entrance to the College of Education, 24.8 per cent of this group of students reacted to tuberculin, while on graduation 28.5 per cent reacted. Thus, only slightly more than 1.0 per cent of the nonreactors became infected each year. Other work in this community leads us to believe that the infection attack rate in the general population is approximately one per cent each year.

The question immediately arises as to why the incidence of infection is higher among the students who enter the School of Medicine than among those who enter the College of Education. There are several possible reasons for this; one is that medical students, having had from two to four years of premedical college work, are several years older than freshmen in the College of Education. Another reason may be that many of our students, because of their early interest in medicine, have worked as orderlies in hospitals, in laboratories, et cetera, and have been more or less in direct or indirect contact with tuberculous patients.

Among the 145 students in this group who developed the primary tuberculosis complex, as manifested by the tuberculin reaction, while in school, 131 (90 per cent) to date had had no symptoms, abnormal physical signs, or x-ray shadows indicating the presence of tuberculosis and so would not have known of the presence of tuberculosis in their bodies had it not been for the routine periodic tuberculin test. This is further evidence that the adult human body combats the first infection with tubercle bacilli with approximately the same degree of success as the child.

In only 14 of the 145 students who became infected has there been demonstrated by all methods any evidence of the location of one or more lesions. Four (2.8 per cent) had evidence only of primary foci located by x-ray examinations. There were no symptoms or abnormal physical signs. Five (3.4 per cent) had only pleurisy with effusion. One (0.7 per cent) developed extrapulmonary clinical tuberculosis and four (2.8 per cent) developed clinical pulmonary disease. Not one has died of tuberculosis, although insufficient time has elapsed for the disease to proceed very far in its evolution in these individuals.

In the five students who developed the reinfection type of pulmonary tuberculosis, a considerable time elapsed between the development of the primary complex and the reinfection type of the disease. For example, one student was first found to be a reactor in February, 1933. His primary focus was located

in the right fourth interspace. In October, 1933, he had pleurisy with effusion on the right side. In January, 1935, approximately two years later, he had a definite lesion in the apex of the right lung with tubercle bacilli in the sputum. He was treated promptly and is now practicing his profession on a full-time basis.

Another student who was first found to be a reactor in April, 1933, had a shadow appear in the right subclavicular region in February, 1935. This never became clinically active but because of the rather long period of time which had elapsed between the finding of the allergic condition and the shadow of the lesion, it was considered as being due to the reinfection type of disease and treatment was administered. At no time was there cough, expectoration, or other symptoms. He is now working on a full-time basis.

Another student was found to react to tuberculin in November, 1934. All films of his chest were clear until July, 1935, when he had hemoptysis. A small but definite area of disease was located in the medial portion of the right upper lobe. Treatment was instituted at once and he has now been restored to full-time working capacity.

The fourth student was found to be a reactor to tuberculin in December, 1934. All x-ray films of his chest were clear while he remained in school, but in the spring of 1938, he was found to have an area of disease in the right lung; tubercle bacilli were present in the sputum. Treatment was instituted immediately and he is now employed as a physician in a sanatorium.

A fifth student was found to react to tuberculin in February, 1935. At this time he had erythema nodosum. In November, 1935, he developed pain over the right third costochondral junction. Aspirated pus produced tuberculosis in guinea-pigs. This lesion was treated successfully by surgery. In July, 1936, a left psoas abscess was aspirated. In January, 1937, an abscess developed over the crest of the right ilium, which drained spontaneously, both posteriorly and laterally. Careful examination of the spine has not revealed definite involvement, although there is a considerable area of disease in one of the intervertebral discs. There is still slight surface drainage, but he is now engaged in full-time work as a sanatorium physician. At no time has it been possible to demonstrate a focus of disease in his lungs.

It is extremely important to note that only 2.8 per cent of this group of 145 students who became infected while in Medical School have developed clinical pulmonary disease. There is a strong tendency to consider every lesion detected in recently infected individuals as of the reinfection clinical type of tuberculosis and thus make the situation appear much more serious than it is. All of the 145 students in this group developed tuberculous lesions in their bodies but over an average period of five years in only 14 was it possible to locate the lesions by modern methods of examination and in only four did clinical disease develop in the lung. Moreover, as the result of early diagnosis, it has been possible to treat these four successfully.

On the other hand, it is equally important to realize that the low mortality

among students and graduates in medicine cannot be used as a criterion of the seriousness of the situation. In the total group which we have studied there have been 11 deaths from tuberculosis. From one point of view this is not a large number. These deaths do, however, represent one-fourth of the deaths from all causes. Furthermore, 107 individuals in the group developed clinically active tuberculosis; and one-half of 293 students who had not been infected with tuberculosis before entering Medical School became infected before graduation and almost one-half of 65 who were still uninfected at the time of graduation became infected during their intern years. This is clearly a serious situation. Yet, the complete story of the toll which tuberculosis has taken in this group cannot be determined until the entire span of life has been passed.

There is much discussion as to whether students who enter school as non-reactors to tuberculin are in a more hazardous position than those who enter as tuberculin reactors. On this point our data are not of much significance. However, this much is perfectly clear. The student who has not already been infected is in the same situation as the uninfected infant; that is, he is susceptible to infection, and if infected, will develop the primary complex. This initial infection carries some hazard of developing into a continuously progressive disease, but it is usually passed through without symptoms, after which the individual is in the same situation as are those who have developed primary complexes earlier in life. The person who reacts positively to tuberculin and is in good health has shown his ability to resist tuberculous infection and probably has developed more or less immunity to the infection. On the other hand, his tissues are allergic to tuberculin and if they are unable to destroy such exogenous infection as he may later take into his body, he will develop a destructive, so-called reinfection type of tuberculosis. Furthermore, he harbors in his body a focus of living tubercle bacilli, which, if his resistance is lowered, may spread to set up an endogenous reinfection type of the disease. From these comments, it is obvious that whether one reacts positively or negatively to tuberculin, it is best to avoid infection and, if one becomes infected, to recognize the condition and place it under treatment just as early as possible.

Protection of Medical Students Against Tuberculosis.—In view of the hazard which exists, what can be done to protect medical students from tuberculosis? In the first place, the Health Service can and should determine periodically, at least once a year, the status of each student in relation to tuberculous infection and tuberculous disease. If lesions are present, they should be studied carefully, so that if treatment is indicated, it may be instituted at the earliest possible moment. By so doing, both the seriousness of the disease and the time lost by the student will be minimized.

A second and equally important part of the tuberculosis control program is the safeguarding of students from infection, and with students I include interns and residents. The infection rate among medical students during their clinical years of the medical course is six times as high as during the first two years; and 50 per cent of previously uninfected students become infected during their internships. These facts can leave no doubt concerning the hazard of infection

which accompanies contact with patients. The major points of exposure for these groups are the hospital, the clinic and the laboratory. Some of the student's hospital experience may be in tuberculosis wards or sanitoria, or with other patients known to have tuberculosis. In such situations, isolation technics, adequate to protect all personnel from infection should be observed. If this is not done, one should consider carefully whether the value of the experience obtained on the tuberculosis service justifies the hazard involved.

Another major source of infection of medical students, interns, nurses and other hospital personnel is the patient with unrecognized tuberculosis in the clinic or in the general wards of the hospital. Such patients may come in with symptoms which are not immediately suggestive of tuberculosis or with some illness which masks the symptoms of tuberculosis. The following are examples of the latter type of case:

A male patient, 38 years of age, was referred to the University Out-Patient Clinic by a physician of the state because of a purulent infection of the left knee joint. Infection had been present for approximately five weeks and had not improved under conservative drainage and treatment. His physical examination was essentially negative, except for the condition of the left knee and a low grade septic type of fever. The patient was admitted to the hospital and thorough surgical drainage and appropriate supplementary treatment were instituted. Marked improvement occurred and he returned to his home. Three weeks later he returned to the hospital because of an exacerbation and extension of the infection. This time the condition failed to respond to treatment. The leg was amputated. Pathologic examination of the knee showed evidence only of a purulent infection. Following the amputation he became weaker and more septic and a slight cough which he had had became progressively worse. Death ensued in approximately three weeks. Pathological examination showed in addition to a general septicemia, advanced pulmonary tuberculosis with cavities and an enormous number of tubercle bacilli in the lungs.

A married woman, 36 years of age, was admitted to the neuropsychiatric service of the University Hospital in a state of severe acute mania. A history of previous maniacal attacks was obtained which led to a tentative diagnosis of manic depressive psychosis. The history was otherwise of no special significance. The patient was wildly overactive, with flights of ideas, profanity and obscenity. Among other forms of regressive behavior she would spit on the floor, the walls and the attendants without warning. Examinations were unsatisfactory because of lack of cooperation. Samples of the sputum scraped from the walls were repeatedly examined for acid-fast bacilli and other bacteria. Several days after admission tubercle bacilli were demonstrated in one of the examinations. Isolation technic was instituted. The patient recovered sufficiently after a few weeks to permit x-ray examination. This disclosed a unilateral pulmonary tuberculosis which was subsequently treated in the Out-Patient Department with a successful outcome.

In view of such occasional cases which came to our attention, we made a special study of tuberculosis among the patients admitted to the general wards

of our University Hospital. Tuberculin tests were made on all patients on admission and x-ray films of the chest were taken of those who reacted positively. By this procedure, among one-fourth of the patients admitted to our 500 bed hospital, over a period of one year, we identified twelve patients who were admitted to the hospital because of other conditions but who had, in addition, active, pulmonary tuberculosis, previously undiagnosed, but moderately or far advanced. All of these patients were potentially infectious. As a result of this study, we have adopted the practice of making a routine roentgenologic examination of the chests of all patients as they are admitted to the hospital. Those patients who are found to have active tuberculosis are handled according to isolation technics. Outpatient clinic patients should be considered potentially infectious and handled accordingly. Adequate precautions should be routine in the autopsy room and other laboratories which handle infectious materials.

SUMMARY

1. Every medical school should provide an ideal health service program for its students.

2. Among the most important elements of such a program are periodic health examinations, immunizations and tuberculosis control.

3. Periodic health examinations are exceedingly valuable as an educational measure as well as a health service procedure. Such examinations should be models of excellence and should be provided annually for all students.

4. Immunization procedures of practical value should be a part of the health service program both because of their educational value and because of the protection which they provide for the students themselves.

5. Tuberculosis was responsible for one-fourth of all deaths and more morbidity than any other disease among the graduates of the University of Minnesota Medical School from 1919 to 1936.

6. Thirty-five per cent of the medical students who were graduated from our Medical School from 1929 to 1936 had been infected with tuberculosis before entering the school; 50 per cent of the remainder became infected during their medical course; and 50 per cent of the ones still uninfected became infected during their internships.

7. The hazard of tuberculosis infection for medical students can be reduced by the application of modern control measures.

DISCUSSION

Dr. M. E. Barnes (State University of Iowa): The papers prepared for this program have discussed the problems of student health services from various points of view.

Dr. Sundwall called attention to the ways in which these services may contribute to medical education. I may add to his list the opportunity afforded for training men for general practice. One or two years spent in such a service, following the completion of internship, would be excellent training for one going into general practice.

Dr. Millikin gave a concrete example of the scope of student health services in his institution. Among other things, his paper illustrates the fact that in dealing with students, hospitalization oftentimes is made for illnesses which would be cared for at home, if that were possible. This no doubt, explains part of the increase in hospital days following the organization of a student health service.

Dr. Ryerson discussed some of the philosophic concepts which such services emphasize, stressing particularly the positive aspects of health. Dr. Diehl showed in a most conclusive manner the importance of these services to the medical students who themselves are destined to provide the leadership in the health programs of the future.

It is difficult to add to the material so adequately presented. However, there are certain additional points which deserve our thoughtful consideration. Fundamentally, a college or university represents an arrangement whereby groups of people are brought together for the convenient interchange of ideas. During such interchange of ideas, the mental and emotional reactions and adjustments of the students measure to a large extent the degree of educational success.

In the gathering together of groups of people from various parts of the country, however, there is necessarily involved the grouping of individuals of diverse immunologic status, which makes the interchange of strains of parasitic microorganisms even more certain to occur than is the interchange of ideas. During the process of developing a new herd immunity to new strains of organisms, a considerable amount of illness (mild or severe) is all but inevitable.

It would appear that the institution responsible for the gathering together of these students has an inescapable moral obligation to safeguard their health in so far as is reasonably possible. Student health services have been developed to meet this responsibility.

As has been pointed out by the essayists, the mere treatment of student illness is not enough. These services are conducted by educational institutions and they have an educational function to perform. Dr. Ryerson stated that health must be considered in positive rather than in negative terms. To develop this point of view is one of the objectives of modern health education. I know of no other agency so ideally suited to study this phase of medicine and to impart to these students the practical applications of this positive concept of health.

We would do well to remind ourselves that students constitute a special group in which social ferment is concentrated and is constantly operating. This has been true since the first institution of learning was established, and it will continue to be true as long in the future as such institutions are permitted to exist.

This fact alone gives to student health services an importance which I fear has been overlooked. Four year of experience under a student health service will tend to crystallize the ideas of this group as to the competence, motives and social-mindedness of the medical profession, as well as to the preventive and remedial measures applicable to human, physical or mental maladjustments.

Every effort should be made to acquaint this group with the best that we have to offer in the field of preventive and curative medicine. It is this group which will constitute the clientele of those engaged in the private practice of medicine. It is this group which will determine by its demands the type of medical practice which will be acceptable.

Under these conditions, as members of the medical profession and as teachers in the medical schools, we cannot be indifferent to the caliber of the staff or to the programs undertaken by the student health services in our midst. On the contrary, it is my opinion that the colleges of medicine have a direct obligation to support and to participate in the student health services not only for the medical but for the nonmedical students of the universities with which they are connected.

Incidentally, there is no college on the campus which is so inconsistent with respect to its own students as is the college of medicine. In so far as its demands on the physical reserves of the students are concerned, there is none more diabolical than is the medical course. This is something of which we should be very much ashamed.

At the State University of Iowa we have attempted to meet the general situation by placing on the head of the department of hygiene and preventive medicine the following responsibilities:

(A) Responsibility for all courses of undergraduate or graduate instruction within the university which deal directly with hygiene, sanitation, preventive medicine or public health, whether designed for medical or nonmedical students.

(B) Responsibility for the application of the principles of preventive medicine and public health to the university as a whole.

To make this possible, there was organized about ten years ago a University Board and Department of Health. As ex officio members, the Dean of the College of Medicine is chairman and the head of the department of hygiene and preventive medicine is secretary. Under the authority of this board there are carried out on a university-wide scale the following:

(1) Inspection service, which is concerned with watching these activities where health hazards may develop, e.g., food-handling, milk, water, swimming pools, etc., and with detecting undiscovered actual or potential hazards, e.g., back-siphonage.

(2) Communicable disease service, which makes an epidemiologic investigation of all cases of transmissible disease appearing within the area. The various clinical departments within the hospitals depend on this service for advice in dealing with such problems to such an extent that in practice the recommendations have become effective almost routinely. This service has done much to insure the safe handling of cases of potential danger which gain admittance to the general services for other causes. For example, just recently we were able to take steps to prevent the sending of a typhoid carrier, who was an expectant mother, to the ordinary obstetric service of another hospital. Gallbladder cases may be cited as another group of potential danger if they are typhoid carriers. The tuberculosis cases mentioned by Dr. Diehl constitute another such actually or potentially dangerous group.

(3) Student health service, wherein are centered predominantly both the preventive and the curative measures which affect the students personally.

Through this arrangement, the department of hygiene and preventive medicine has an interesting field in which to practice, has a wonderful opportunity in which to direct nonmedical health education, and always has a new array of material for study and for the instruction of medical students. Through this arrangement the College of Medicine is brought into intimate relations with the problems of the university with which it is connected. It has operated smoothly and successfully for many years, and it would appear that similar arrangements should be feasible in other institutions having colleges of medicine.

The Tutorial System in the Harvard Medical School*

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Experimentation in medical teaching is equally as important as experimentation in medical sciences, if we are to improve our methods of teaching and allow for the development of the superior student as well as the mediocre one. Twenty years ago, Harvard Medical School came under the guidance of a true experimentalist, Dr. David L. Edsall. That he should be so designated seems most appropriate because he made important contributions to the medical literature, fostered the establishment of clinical research in the leading medical schools of this country and increased the prestige of the group of institutions which constitute the Harvard Medical School. It was he who introduced to the Harvard Medical School an innovation in its method of teaching, a modified form of the Oxford preceptorial or tutorial system.

I think we will all agree that the chief function of a medical school is to foster growth and change in the direction of an ideal. Dr. Edsall's ideal was the evolution of a teaching system which allowed for the fullest development of the largest number of individual students. He was of the opinion that the faculties of our American medical schools expended their efforts in turning out the best average doctor. This he sanctioned, but he deplored the fact that in our zealous efforts to foster and improve mediocrity we wasted some of the finest material in each class. He contended that our methods of teaching should be sufficiently elastic and varied to allow for the fullest development of the exceptional student as well as the mediocre one. He willingly agreed that most medical students do not think. This fault he ascribed as being not the result of certain inherent shortcomings of the students but rather the faculty's tendency to tell the students what to do and what to think.

We all desire the greatest possible number of students possessing the spirit of adventure, of inquiry, and of experimentation, as well as the desire to learn the science and art of medicine. Each one of our medical students possessed as a child a certain natural instinct to investigate his surroundings, a phase of development which has been described by some as representing the unconscious instinct for self-preservation. This native curiosity to observe and to reason is frequently short-lived. It is actually discouraged in many of our elementary and general institutions of education because they strive mainly to raise the level of mediocrity. Although many of the products of this system of education are very intelligent, they are curiously lacking in the initiative and boldness which is so necessary for their departure from the routine and for doing things on their own. Because of exposure to such educational methods, the average student soon tends to believe

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only what he reads or is told, failing to appreciate that what he reads or hears, in so far as it is true, represents adventurous contacts of men in the past. It was Dr. Edsall's hope that some method of teaching could be introduced which would reawaken and stimulate this natural curiosity to learn and thus promote the spirit of scientific investigation so necessary for the practice of good medicine and research in the medical sciences. He thought that the tutorial system might remedy, in part, the defects in education to which some of the students have been exposed previously.

There can be little doubt but what the power and biological effectiveness of the brain cells of a medical student depends in part on the stimuli to which they are subjected. Dr. Edsall willingly granted that some students of superior intellect were readily detected. He was of the belief, however, that each class contained a few men labelled students without promise who, when exposed consciously or unconsciously to certain intellectual stimuli, were transformed into students of promise. It was his hope that the introduction of the tutorial system into the medical school would make possible more such transmutations as well as to allow for the development of more intellectual independence, initiative, curiosity and boldness in students of medicine. He well appreciated that so radical a departure from an established method designed to be the best for the majority was somewhat of a gamble, particularly if many of the students exposed to such educational experimentation fared worse than if they had continued in the well established conventional routine. Being a true experimentalist, he did not allow the fear and disapproval of many faculty members to deter him from his original contention that exceptional students should be allowed to develop their individuality and personal powers of scholarship and initiative. Dr. Edsall chose well when he selected Dr. Alfred Redfield as the first chief tutor. Dr. Redfield's ability to detect and bring out the abilities of obvious or undiscovered exceptional men is well attested to by the records of the men chosen for tutorial work in the first five years of its existence.

The system as originally outlined was to allow for four tutors, one each in physiology, pathology, medicine and surgery. The allotted budget has never permitted a tutor in pathology. The students chosen are those showing evidence of superior capacity who are desirous of and capable of doing extra and advanced work along some definite line in any one of the medical sciences or major divisions of medicine. As a pure experiment, a few mediocre men have been chosen from time to time. No one tutor attempts to direct the work of each man in his group but does place each student in intimate contact with the particular member of the faculty best fitted for his needs. In consequence, men are placed in anatomy, bacteriology, physiology, biological and physical chemistry, neurology, medicine and surgery. This placement system has the added advantage of inoculating more faculty members with the spirit of the system and acquainting them with its merits, providing time and caution have been exercised in choosing the students and their respective problems.

It is not the purpose of the tutorial system to wean men away from medicine into the medical sciences, but rather to aid in what must become more and

more the general object of medical education, the sending into medicine of men with scientifically trained minds. The majority of the men exposed to this system plan to and do practice medicine. Emphasis is placed on experimentation, because of all scholarly disciplines, it seems best fitted to attract the interest of the student. Original discovery and its publication are stressed only because these objects in experimentation convert discipline into a goal worthy of pursuit for its own end and confront the student with the reality of the advancement of knowledge.

While it was not the original intention to have men in the first year participate in the tutorial system, it has proved practical to include them and indeed desirable to devote considerable effort in preparing men during the first year for further participation in the system. Those first year men who have had some previous training in the fundamental medical sciences are permitted to work at original problems in the laboratory under the guidance of their tutors.

The system as worked out by Dr. Redfield for the first year was about as follows: He devoted his entire time to tutorial work during the period the students were taking physiology. Early in the second semester, he chose a small group of students who he thought, for one reason or another, showed promise of being exceptional or unusual. These men were exempt from the routine physiological laboratory work. Those men who had had previous training were assigned to problem work under the direction of a member of the physiology department. The men who had not had previous exposure to problem work were carried as a group by Dr. Redfield. These men worked as a team or as group members of a team. Each week one experiment was performed. The experiment was so arranged as to occupy the greater part of a day and to illustrate some general type of physiological phenomenon.

At the end of each week, several hours were devoted to a conference in which the experiment and the reading done pertaining to the general subject which the experiment illustrated were discussed informally. At this conference a syllabus of the next week's work was given out and discussed. It contained not only directions concerning the experiment but also references to reading and a list of detailed topics which were intended to suggest to the student the things which he should understand as the result of his reading. The references were always more extensive than could be covered in the available time, thus forcing the student to select for himself. He was, however, guided by certain verbal recommendations from the tutor. The amount of reading done by the students was surprisingly great. Many of them read from 150 to 200 pages in addition to the assignment in the regular textbook. Their reading was quite diversified, covering such works as Lusk's "Science of Nutrition," Haldane's "Respiration," Bancroft's "Respiratory Function of Blood," Bainbridge's "Physiology of Muscular Exercise," Krogh's "Anatomy and Physiology of the Capillaries," as well as special articles from "The Harvey Lectures," "Physiological Reviews," and the like.

In spite of the fact that absolutely no effort was made to prepare them for the regular examinations in physiology, these men were able to compare very favorably with their fellow classmates in this type of competition. These men

all agreed that their extensive reading, the informal discussion periods and the limited experimental experience were most stimulating. The problems of medicine became more real, and, in consequence, the student's initiative and imagination were called into play. Some of these men gained for the first time a true sense of intellectual confidence, yet they seemingly understood the true meaning of the word humility.

The men ferreted out of the first year class by the physiology tutor are encouraged to work under the tutorial system in the second and third years, in the spare time afforded by the two free afternoons provided some years ago by rearrangement of the curriculum. The second and third year men may work in any one of the fundamental sciences under the direction of a sympathetic faculty member. The accomplishment of some men is negligible, for one reason or another, but the system has demonstrated that if given a suitable problem to work upon, very creditable achievement can be made by a determined student in the time available in his second and third years. In handling these students after the first year, it has been held advisable to avoid organized series of lectures or conferences or any other form of group instruction, as the regular curriculum already affords an excess of this sort of intellectual exercise. Each student or pair of students is given a problem to investigate. Experience has shown that it is better to give a very definite problem for immediate experimental attack to be followed by wide reading rather than to reverse the process.

Some of the men do continuous research work along a specific line throughout their four years in medical school. In the fourth year, the faculty permits a limited number of men whose cases are individually approved to have much freedom in the use of their time. This may amount to as much as four or five months. In most instances, the students electing tutorial work anticipate most of the prescribed regular work by taking two or three months of summer work. Many of the fourth year students continue with advanced work in the medical sciences as a preparation for their future clinical work. The other fourth year tutorial students work in the laboratory on clinical problems concerning patients under the direction of a member of the faculty of their own choosing. In such instances they may become a member of a research group, thus gaining intimate contact and experience with the many aspects of the particular problem. In the laboratory, no effort is made to suppress opinion, but open consideration of all problems worthy of discussion is invited. It is impressed on the student that the laboratory is not a sanctuary for the worship of authorities or heroes, but a free dwelling for students of medicine conscious of the faults and the virtues of those who surround them.

During the fourth year, informal weekly conferences are held where topics of the students' choosing are discussed with the tutors or various members of the faculty.

Although sufficient time has not elapsed to allow us to determine the fate of all students subjected to this type of medical teaching, it would seem fair to examine the records to date of the sixty-two men from the classes of 1925 to 1929 inclusive. Three have died. Thirty-four of the remaining fifty-nine gradu-

ated with honors. Fourteen are in full-time work, six having remained in the medical sciences. The remaining twenty men are engaged in practice, twelve being actively associated with teaching hospitals. Of the twenty-five men who graduated with a grade of C, seven are in full-time work, eighteen are practicing medicine, and nine of these are members of teaching hospitals. Although the series is small, the results to date would seem to suggest: (1) That medical students can engage in special extracurricular work along one line without jeopardizing their regular work; (2) that although men of superior capacity perform better than do men of mediocre ability, the latter group also benefit from this type of teaching; (3) that a large percentage of the men exposed to this type of scientific training contribute to the advancement of medicine and medical teaching.

Many interesting experiences have been encountered, a few of which might be mentioned. Several of the men became sufficiently interested in physiology and biochemistry to take off a year or two for concentrated work in these fields before continuing with their regular medical curriculum. All of these men returned to the field of medical sciences on obtaining their M.D. degrees. One is at present professor of physiology at one of our leading medical schools. Several of the men, selected because of exceptional records in college, proved difficult for a time because of their inability to correlate, eliminate and dig out facts suggested in their problem work. At first, these men tended to spread themselves too thin. It was found, however, that experimentation requiring exacting measurements served as an excellent discipline for this type of mind. Another man entered the medical school after a year's work in a New York bank because he desired a career of some intellectual interest. It was soon found that he considered his training in chemistry extremely deficient, and, in addition, he greatly underestimated his mental ability. This attitude, and his much feared deficiency in chemistry, gradually disappeared as he found himself capable of carrying out detailed chemical experiments. He is at present an assistant professor of pediatrics and has made extremely worth while contributions in inorganic salt metabolism. Many similar experiences might be related, but these few examples serve to strengthen Dr. Edsall's original contention that men of real capacity may go undiscovered if an effort is not made to find them.

Some of the men did not enter tutorial work until their fourth year. This group was equally enthusiastic. They considered it extremely worth while because it not only enabled them to participate in investigative work, but also because it made possible intimate contact with a faculty member and gave them a better insight into the problems of a particular field. In many instances, this short exposure was sufficient to aid the student to verify a previous suspicion, namely, that he liked experimental work and was sufficiently adapted to it to want to continue with it in some degree in his future work.

Some of these men have since stated that the most important decision they made in their medical school career was that they should do what they had always thought wrong, i.e., to depart from the schedule the faculty had made and to take free election of their fourth year work. The accomplishments of

some of these men to date is good evidence that if superior men are allowed such privileges they cannot only meet the routine requirement with ease but also establish a sound base on which to build their future careers.

It is hardly necessary to remind you that those men who practice medicine may advance scientific medicine as effectively as does the laboratory monk. Surely, such advancements will be equally possible by the practitioner of medicine who during his training was sufficiently exposed to scientific research to allow for the development of intellectual independence, initiative, curiosity and boldness. The development of such traits in the practitioner of medicine should in no way interfere with his practice of the art of medicine, so necessary for the comfort of the patient.

DISCUSSION

DR. ALAN M. CHESNEY (Johns Hopkins University): How many tutors are required at the present time?

DR. CURRIER MCEWEN (New York University): How much of the regular curricular work do these men take during their four years? Does the tutorial system replace the regular curricular work or is the work done on the tutorial basis merely in addition to that of the regular schedule?

DR. WILLIAM S. LADD (Cornell University Medical College): How do the other medical students regard this system, those that do not get into the tutorial system? What effect does it have on them and their attitude toward the students who have been able to avail themselves of the tutorial system?

DR. ROBERT U. PATTERSON (University of Oklahoma): What effect has this plan had on the health of those taking this extra work?

DR. WALTER BAUER: There are three tutors, one each in physiology, medicine and surgery. A large body of tutors is not required because after the first year most of the men work with faculty members of all departments. The men may work in any one of the fundamental science or clinical departments. There are rarely more than fifteen men in any one class assigned to tutorial work. As I stated before, most of the first year men are ferreted out by the physiology tutor. His reasons for picking the fifteen or so men are very varied. He does so largely because he believes they will enjoy digging things out for themselves.

The tutorial students are required to take the routine medical curriculum throughout the first three years. In the fourth year this same limited number of students is allowed a period of four to five months for this special work with some one member of the faculty. As I stated, all of the students anticipate taking tutorial work by taking two or three months of their regular curricular work during the preceding summer.

I should say that the effect on the other students is very favorable. This is well shown in the fourth year. Many of the regular students will elect to spend their spare one to three months working in medicine, surgery and other specialties on subjects other than those given in the regular curriculum.

I think it is only fair to say that some of the regular students do not favor the tutorial system. This group think that the present-day medical school curriculum is so full that a man should spend all of his time on it and not indulge in any such extra-curricular activity.

I am very sorry to say, Dr. Patterson, that I cannot quote a definite figure. I do know of one man who a year ago fell ill with pleurisy and required a subsequent stay at Saranac. That happens to be the only case that I can recall at this time. However, if I were to go over the records of all students exposed to this system since the year 1922, I might find others. I think the point is well taken, namely, that we do not want to overload our students to such a point that they fall ill in consequence thereof.

Southern Medical Schools and Physicians of the Past Century and a Half*

WILBURT C. DAVISON

Medical education in the South and medical service, which is inseparable from it, have had a glorious past, a drastic "decline," a "promising" present and, though they face a serious problem, we trust the future will be brilliant.

Southern medical education began with the establishment of the medical school at Transylvania University in Lexington, Kentucky, in 1799. This was only thirty-four years after John Morgan opened the first American medical school in Philadelphia. During the next century, seventy-five schools were organized and flourished for a time. Of these, sixteen are now extant and thirteen of them have a four year curriculum (Appendix A).

Many of the medical schools, both North and South, founded during the nineteenth century, were proprietary commercial ventures for the collection of fees from students and to increase the teachers' practices. They were lecture mills, usually repeating the same courses each year, followed by little or no practical work, except apprenticeship to an older physician. "Sessions at most institutions were limited to three or four months, since most of the students were already practicing and could not afford to desert their patients for a longer time. Although the course usually lasted two sessions, there was no division into grades; the pupils sat through the same curriculum twice over, on the theory that what they did not understand the first time they might understand the second."[1] Hospital and laboratory work was almost unknown (Appendix B). One of the Southern schools flourished twenty-seven years before any hospital was started in the same city.[2] In fact, as late as 1894, Osler felt that his greatest contribution to medicine was "bringing the students to the wards."

The South, however, had the one outstanding exception in this disregard of clinical teaching. The prospectus of The Medical College of Louisiana (now Tulane University School of Medicine) in 1834 carried this statement: "New Orleans was selected for the location of the school because its hospitals are the largest in the Southern and Western States, and because its hospitals are filled with patients so that Practical Medicine and Surgery can be taught at the bedside of the patient, the only place for this study; and because many surgical accidents occur, and it is consequently the best field for the study of Surgery in the Southwest."[3]

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*From the Department of Pediatrics, Duke University School of Medicine and Duke Hospital, Durham, N. C., with the kind and valuable assistance of Miss Judith Farrar, Librarian of Duke Hospital. Many of the data were abstracted from Davison, W. C.: A Survey of Medical Education in the South; address at the Inauguration of Oliver C. Carmichael as Chancellor of Vanderbilt University, and a Symposium on Higher Education in the South, Nashville, Tenn., Vanderbilt University, (Feb. 4) 1938.

1. FLEXNER, J. T.: Doctors on Horseback, New York, Viking Press, 1937.
2. DUKE ENDOWMENT: Hospital Section, Fifth Annual Report, 1929.
3. FOSSIER, A. E.: History of Medical Education in New Orleans. Ann. M. Hist. 6 n.s.:320-352 (July) 427-447 (Sept.), 1934.

Premedical education of "adeptness in Latin, Greek, French, mathematics, and natural philosophy" was recommended by John Morgan in 1765,[4] and Daniel Drake, in 1820, "insisted that every pupil should have a first class education in literature, classics, French, mathematics, mechanics, history and geography. However, these premedical requirements were thrown into the dump heap whence they were salvaged with great éclat by the founders of the Johns Hopkins University; for more than a century any untrained lad was allowed to study medicine anywhere in America."[1]

The South has produced many eminent physicians, some from its own schools and others with additional training in Philadelphia, Edinburgh or Paris. The biographies of 372 of these men have been published (Appendix C). The French influence was particularly strong in Savannah and New Orleans, and the library of the Medical Society of Georgia, founded in 1804, which was transferred to Duke University in 1931, contains many books by Corvisart, Andral and Louis. The Transylvania medical library also was one of the best in the nineteenth century, for it was early recognized that a good library is essential to every medical school. "To study the phenomena of disease without books is to sail an uncharted sea, while to study books without patients is not to go to sea at all." (Osler.)

SUMMARY

Of the sixteen Southern medical schools which remain of the original seventy-five, six were founded between 1823 and 1838, two in the fifties, three in the seventies, one in the nineties, two at the turn of the twentieth century. Duke admitted its first students in 1930, and Louisiana State University in 1931. Of these sixteen schools, nine are supported by their states, one by its city and six by endowed universities.

APPENDIX A

Past and Present Southern Medical Schools (the latter are in italics; the South in this survey is considered as the ten States south of Washington and east of the Mississippi River).

Alabama

University of Alabama School of Medicine, University. 1859-

Graefenberg Medical Institute, Dadeville. 1852-1862.

Southern University, Medical Department, Greensboro. 1872-1880.

Birmingham Medical College, Birmingham. 1894-1915.

Medical College, Montezuma University, Bessemer. 1896-1898.

Florida

Tallahassee College of Medicine and Surgery, Medical Department of the University of Florida, Jacksonville. 1883-1886.

Georgia

University of Georgia School of Medicine, Augusta. 1828-

Emory University School of Medicine, Atlanta. 1854-

Savannah Medical College. 1838-1880.

Southern-Botanical-Medical College, Forsythe and Macon. 1839-1874.

Thomsonian College, Barbourville. 1850-extinct.

Reform Medical College, Macon. 1854-1874.

Oglethorpe Medical College, Savannah. 1856-1861.

Middle Georgia Medical College, Griffin. 1859-extinct.

Dalton Medical College, Dalton. 1866-extinct.

College of American Medicine and Surgery, Atlanta. 1874-1884.

Georgia College of Eclectic Medicine and Surgery, Atlanta. 1877-1916.

Southern Medical College, Atlanta. 1878-1898.

Clark University Medical Department, Atlanta. 1886-extinct.

Woman's Medical College of Georgia and Training School for Nurses, Atlanta. 1889-extinct.

Atlanta College of Physicians and Surgeons. 1898-1913.

International Medical Missionary College and Training School for Nurses, Atlanta. 1904-1908.

Atlanta School of Medicine. 1905-1913.

Hospital Medical College, Eclectic, Atlanta. 1908-1911.

Southern College of Medicine and Surgery, Atlanta. 1911-1914.

4. Morgan, John: A Discourse Upon the Institution of Medical Schools in America, Printed by William Bradford, Philadelphia, 1765. (Republished as Vol. II, Fourth Series, Bibliotheca Medica Americana, by The Johns Hopkins Press, 1937.)

KENTUCKY

University of Louisville School of Medicine (Transylvania), Louisville. 1837-

Kentucky School of Medicine, Louisville. 1799-1908.

Eclectic Medical College, Louisville. 1848-extinct.

Louisville Medical College, Louisville. 1869-1907.

Hospital College of Medicine, Louisville. 1874-1907.

Jefferson School of Medicine, Louisville, 1872-extinct.

Louisville National Medical College, Medical Department State University, Louisville. 1888-1912.

Southwestern Homeopathic Medical College and Hospital, Louisville. 1892-1910.

Kentucky University Medical Department, Louisville. 1898-1907.

State University Medical Department, Louisville. 1899-1903.

Louisville and Hospital Medical College, Louisville. 1907-1908.

LOUISIANA

Tulane University of Louisiana School of Medicine (Medical College of Louisiana). New Orleans. 1834-

Louisiana State University Medical Center, New Orleans. 1931-

New Orleans School of Medicine. 1856-1870.

Charity Hospital Medical College, New Orleans. 1873-1877.

Flint Medical College of New Orleans University, New Orleans. 1899-1911.

MISSISSIPPI

University of Mississippi School of Medicine, University. 1903-

NORTH CAROLINA

University of North Carolina School of Medicine, Chapel Hill. 1879-

Wake Forest College School of Medicine, Wake Forest, 1902-

Duke University School of Medicine, Durham. 1930-

Edenborough Medical College, Edenborough Community, Robeson County (Hoke). 1866-1877.

Leonard Medical School, Raleigh. 1882-1918.

North Carolina Medical College, Charlotte. 1887-1918.

SOUTH CAROLINA

Medical College of the State of South Carolina, Charleston. 1823-

University of South Carolina Medical Department, Columbia. 1866-1876.

Charleston Medical School, Charleston. 1894-1895.

TENNESSEE

Vanderbilt University School of Medicine, Nashville. 1874-

University of Tennessee College of Medicine, Memphis. 1876-

Meharry Medical College, Nashville. 1876-

University of Nashville Medical Department. 1850-1911.

Memphis Medical College. 1854-1873.

Jefferson Medical Association, Dandridge. 1854-1875.

Eclectic Medical Institute, Memphis. 1857-1861.

Shelby Medical College, Nashville. 1858-1862.

Memphis Hospital Medical College, Memphis. 1878-1913.

Chattanooga Medical College. 1889-1908.

Lincoln Memorial University Medical Department, Knoxville. 1889-1914.

Hannibal Medical College, Memphis. 1889-1896.

University of the South Medical Department (Sewanee Medical College), Sewanee. 1892-1909.

Knoxville College Medical Department. 1895-1900.

Chattanooga National Medical College. 1899-1908.

Knoxville Medical College. 1900-1910.

University of West Tennessee College of Medicine and Surgery, Memphis. 1900-1923.

College of Physicians and Surgeons, Memphis. 1906-1911.

VIRGINIA

University of Virginia Department of Medicine, Charlottesville. 1824-

Medical College of Virginia, Richmond. 1838-

Medical School of the Valley of Virginia, Winchester. 1826-1861.

Winchester Medical College. 1826-extinct.

Randolph Macon College Medical Department, Prince Edward Court House. 1840-1855.

University College of Medicine, Richmond. 1893-1913.

APPENDIX B

The Edenborough Medical College, chartered as the first medical school in North Carolina in 1866, was a two story wooden building with eight rooms. The upper story was used as a residence for the medical students and they boarded with Dr. Hector McLean while studying medicine. The lower floor was used for medical college purposes, including an anatomical laboratory. The Edenborough Medical College was conducted in this building for ten years or little more, up to 1877, at which time Dr. Hector McLean died. Dr. McLean did all the teaching, without any help.[5]

Daniel Drake's Medical College of Ohio in 1819 was conducted in rented lecture rooms over his father's grocery store in Cincinnati.[1]

APPENDIX C

Distinguished Southern Physicians, Surgeons and Medical Teachers.[6]

ALABAMA: J. Y. Bassett (1805-1851; "Alabama Medical Student"); Nathan Bozeman (1825-1905; colpocleisis); Samuel Brown (1769-1830; *N. Am. M. & Surg. J.*); Jerome Cochran (1831-1896; legal medicine); W. E. B. Davis (1863-1902; gynecology); J. W. Heustis (1784-1841; medicine); J. F. Heustis (1829-1891; surgery); J. V. O. Laurence (1791-1823; Philadelphia School of Anatomy); T. L. Maddin (1826-1908; traumatic aneurysm repair); C. H. Mastin (1826-1898; metallic ligature); A. B. Miles (1852-1894; gunshot wounds of the abdomen); C. A. Pope (1818-1870; surgery); S. D. Powell (1847-1907; carbolic acid treatment of leg ulcers); J. Marion Sims (1813-1883; obstetrical speculum, silver wire suture, vesicovaginal fistula).

FLORIDA: E. P. Andrade (1872-1906; bacteriology); A. W. Chapman (1809-1899; botany); John Gorrie (1803-1855; artificial refrigeration); R. B. S. Hargis (1818-1893; yellow fever); G. T. Maxwell (1827-1879; laryngoscopy); R. D. Murray (1845-1903; tropical diseases).

GEORGIA: J. F. Alexander (1826-1903; smallpox); Milton Antony (1789-1839; *Southern M.*

5. WAY, J. H. and MCBRAYER, L. B.: Medical Colleges in North Carolina, Trans. M. Soc. State North Carolina 75:136-156, 1928.

6. KELLY, H. A. and BURRAGE, W. L.: American Medical Biographies, Baltimore, Norman Remington Co., 1920; Garrison, F. H.: History of Medicine, Philadelphia, W. B. Saunders Company, 1924.

J.); R. D. Arnold (1808-1876; medical organization); Robert Battey (1828-1895; oöphorectomy); W. G. Bullock (1815-1885; ophthalmology); R. B. Burroughs (1833-1901; surgery); F. H. Caldwell (1857-1906; hospital system); A. W. Calhoun (1846-1910; eye, ear, nose and throat); H. F. Campbell (1824-1891; excito-secretory function of the nervous system); J. M. Carnochan (1817-1887; surgery); A. M. Cartledge (1858-1908; removal of huge ovarian cyst); T. J. Charlton (1833-1886; surgery and obstetrics); J. M. Cuyler (1810?-1884; surgery); W. H. Doughty (1836-1905; medicine); L. A. Dugas (1806-1884; ophthalmology); J. A. Eve (1805-1886; teacher); Lyman Hall (1731-1790; politics); W. P. Johnston (1811-1876; obstetrics & gynecology); Joseph Jones (1833-1896; Diseases in the Southern States); T. S. Latimer (1839-1906; medicine); M. C. Leavenworth (1796-1862; surgery & botany); John LeConte (1818-1891; physics); Joseph LeConte (1823-1901; geology); Crawford W. Long (1815-1878; ether anesthesia); James Lynah (1725-1809; medicine); C. W. Meigs (1792-1869; coronary thrombosis in obstetrics); J. H. Pope (1845-1915; public health); T. O. Powell (1837-1907; psychiatry); Peter Smith (1753-1816; "dispensatory"); V. H. Taliaferro (1831-1887; gynecology); J. G. Thomas (1835-1884; public health); J. G. Westmoreland (1816-1887; medicine); W. F. Westmoreland (1828-1890; surgery).

Kentucky: Turner Anderson (1842-1908; surgery); S. Annan (1797-1868; bronchotomy); T. S. Bell (1807-1884; *Western M. J.*); Robert Best (1790-1830; chemistry); L. P. Blackburn 1816-1887; yellow fever); J. M. Bodine (1831-1915; anatomy); William Bowling (1808-1885; cholera); J. T. Bradford (1818-1871; ovariotomy); Walter Bradshear (1776-1860; amputation of hip); J. R. Buchanan (1814-1899; physiology); H. M. Bullitt (1817-1880; teacher); J. M. Bush (1808-1875; anatomy); W. S. Chipley (1810-1880; psychiatry); W. S. Christopher (1859-1905; pediatrics); Daniel Drake (1785-1852; Diseases of the Interior Valley of North America); B. W. Dudley (1785-1870; lithotomy); E. L. Dudley (1818-1862; anatomy & surgery); John Eberle (1787-1838; materia medica); Nathaniel Field (1805-1888; surgery); J. B. Flint (1801-1864; ether administration); L. J. Frazee (1819-1905; "The Medical Student in Europe"); Middleton Goldsmith (1818-1887; lithotripsy); John Goodman (1837-1912; obstetrics); E. H. Gregory (1824-1906; anatomy and surgery); Samuel D. Gross (1805-1884; surgery); W. W. Hall (1810-1876; Hall's Medical Advisor); J. P. Harrison (1796-1849; materia medica); W. W. Hitt (1801-1876; medicine); J. T. Hodgen (1826-1882; orthopedics); J. M. Holloway (1834-1905; medicine); J. D. Jackson (1834-1875; biographer of Ephraim McDowell); F. M. Johnson (1828-1893; 3rd curve to obstetrical forceps); A. W. Johnstone (1853-1905; gynecology); W. P. Jones (1819-1897; alienism); Albert Kellog (1813-1887; botany); L. M. Lawson (1812-1864; medicine); L. F. Linn (1795-1843; medicine); Starling Loving (1827-1911; medicine); Charles McCreery (1785-1826; extirpation of clavicle); Clarke McDermont (1823-1881; surgery); Ephraim McDowell (1771-1830; ovariotomy); J. N. McDowell (1803-1868; anatomy); W. A. McDowell (1795-1853; tuberculosis); J. B. Marvin (1852-1913; microscopy); F. F. Maury (1840-1879; gastrotomy); F. A. Meacham (1862-1902; Public Health in Philippines); S. L. Metcalfe (1798-1856; research); Henry Miller (1800-1874; obstetrics); T. D. Mitchell (1791-1865; materia medica); P. A. Morrow (1846-1913; dermatology); R. S. Newton (1818-1881; surgery); J. G. Norwood (1807-1895; geology); Robert Peter (1805-1894; chemistry); W. B. Powell (1799-1867; cerebral physiology); Dudley S. Reynolds (1842-1915; oto-ophthalmology); Wm. L. Rodman (1858-1916; National Board of Medical Examiners); J. C. Rogers (1781-1855; surgery); Lewis Rogers (1812-1875; materia medica); C. W. Short (1794-1863; materia medica); J. T. Shotwell (1807-1850; anatomy); B. F. Shumard (1820-1869; geology); H. M. Skillman (1824-1902; medicine); R. F. Stone (1844-1913; "Eminent American Physicians and Surgeons"); W. T. Taliaferro (1795-1871; ophthalmology); Wm. H. Wathen (1846-1913; vaginal surgery); H. A. West (1830-1903; medicine); James Wilkinson (1757-1825; politics); Elkanah Williams (1822-1888; ophthalmology); W. H. Wishard (1816-1913; medicine); T. D. Wooten (1829-1906; medicine); L. P. Yandell (1805-1878; paleontology).

Louisiana: E. H. Barton (——1859; yellow fever); D. W. Brickell (1824-1881; gynecology); S. E. Chaillé (1830-1911; anatomy); S. P. Choppin (1828-1880; yellow fever); F. E. Daniel (1839-1914; "Recollections of a Rebel Surgeon"); A. W. DeRoaldes (1849-1918; otolaryngology); Bennet Dowler (1797-1879; physiology); L. C. Faget (1818-1884; yellow fever); S. S. Herrick (1833-1906; chemistry); W. H. Holcombe (1825-1873; homeopathy); Thomas Hunt (1808-1867; dermatology); James Jones (1807-1873; obstetrics and gynecology); A. R. Kilpatrick (1817-1887; surgery); C. A. Luzenberg (1805-1848; surgery); J. W. McLaughlin (1840-1909; dengue bacillus); Alfred Meicier (1816-1894; literature); J. A. Ouchterlony (1838-1908; Preventive Treatment of Tuberculosis); D. D. Owen (1807-1860; geology); D. L. Phares (1817-1892; medical herbes); F. M. Prevost (1765-1842; Caesarian section); T. G. Richardson (1827-1892; surgery); J. L. Riddell (1807-1867; binocular microscope); H. D. Schmidt (1823-1888; origin of bile ducts); Moritz Schuppert (1817-1887; antiseptic surgery); A. J. Semmes (1828-1898; surgery); A. W. Smyth (1833-1916; surgery); Warren Stone (1808-1872; thoracotomy in empyema); Warren Stone II (1843-1883; surgery); J. C. Touatre (1838-1901; yellow fever).

Mississippi: J. P. Davidson (1812-1890; medicine); Greensville Dowell (1822-1881; yellow fever); S. C. Martin (1837-1906; dermatology); J. W. Monette (1803-1851; quarantine of yellow fever); M. A. Pallen (1836-1892; gynecology); W. H. Rowan (1875-1917; public health); John Tackett (1815-1891; Caesarian section).

North Carolina: Nathaniel Alexander (1756-1808; education); Ephraim Brevard (1750?-1783; Mecklenburg Declaration of Independence); John Brickell (1710?-1745; "The Natural History of North Carolina"); John Brickell (1749-1809; botany); Bedford Brown (1825-1897; surgery); Charles Caldwell (1772-1853; yellow fever); A. J. DeRosset (1695-1760; founded Episcopal Church); A. J. DeRossett II (1767-1859; delivered 61 year old woman); A. J. DeRossett III (1824-1896; medicine); M. J. DeRossett II (1796-1826; medicine); M. J. DeRossett III (1838-1881; founded *North Carolina M. J.*); Richard Dillard (1822-1887; medicine); Susan Dimock (1847-1875; medicine); Eugene Grissom (1831-1902; legal medicine); E. B. Haywood (1825-1894; surgery); M. H. Henry (1835-1895; *Am. J. Syphilis & Dermat.*); W. T. Howard (1821-1907; gynecology); C. E. Johnson (1812-1876; medicine); Calvin Jones (1775-1846; vaccination); J. B. Jones (1814-1899; gynecology); W. P. Mallett (1816-1899; Caesarian section); O. F. Manson (1822-1888; surgery); P. L. Murphy (1848-1907; psychiatry); W. A. R. Norcom (1836-1881; malaria); C. J. O'Hagen (1821-1900; medicine); A. Raffeneau-Delile (1778-1850; botany); Ashbel Smith (1805-1886; medicine); E. C. F. Strudwick (1802-1879; surgery); W. G. Thomas (1818-1890; gynecology); D. R. Wallace (1825-1911; psychiatry); Edward Warren (1828-1893; surgery); J. A. Washington (1803-1847; hypodermic morphine); R. H. Whitehead (1865-1916; "Anatomy of the Brain"); Hugh Williamson (1735-1819; medicine); Caleb Winslow (1824-1895; lithotomy); T. F. Wood (1841-1892; medicine).

South Carolina: J. L. R. Agassiz (1807-1873; anatomy); J. D. Bruns (1836-1883; "Life, Its Relations, Animal & Mental"), William Bull (1710-1791; administrator); H. L. Byrd (1830-1884; diseases of women and children); J. J. Chisholm (1830-1903; eye and ear); Thomas

Cooper (1759-1839; chemistry); R. O. Cowling (1839-1881; surgery); Frederick Dalcho (1770-1836; theology); J. T. Darby (1836-1879; surgery); J. L. Dawson (1815-1896; statistics); S. H. Dickinson (1798-1872; pioneer medicine); P. D. Fayssoux (1745-1795; surgery); H. R. Frost (1790-1866; materia medica); Alexander Garden (1728-1791; botany); J. M. Gaston (1824-1903; surgery); Eli Geddings (1799-1878; anatomy); L. R. Gibbes (1810-1894; mathematics and natural science); R. W. Gibbes (1809-1866; chemistry and geology); Joseph Glover (1778-1840; tapping hydrocephalus); T. F. Green (1804-1879; psychiatry); J. E. Holbrook (1794-1871; herpetology and ichthyology); F. K. Huger (1773-1885; surgery); J. P. Jervey (1808-1875; medicine); Joseph Johnson (1776-1862; medicine and history); R. A. Kinlock (1826-1891; surgery); Cornelius Killock (1824-1897; gynecology and surgery); John Lining (1708-1760; meteorology); George Logan (1778-1861; surgery); Samuel Logan (1831-1893; surgery); T. M. Logan (1808-1876; medicine); James Macbride (1784-1817; botany); G. E. Manigault (1833-1899; natural science); J. H. Mellichamp (1829-1903; medicine & botany); C. E. Michel (1832-1913; ophthalmology); W. B. Michel (1822-1894; physiology); F. T. Miles (1827-1903; neurology); S. P. Moore (1813-1889; medicine); James Moultrie (1793-1869; physiology); J. C. Nott (1804-1873; yellow fever); F. P. Porcher (1825-1895; medical botany); David Ramsay (1749-1815; history); Edmund Ravenel (1797-1870; chemistry and conchology); St. Julien Ravenel (1819-1892; chemistry); J. W. Russell (1804-1887; spina bifida); J. L. E. W. Shecut (1770-1836; medicine); B. B. Simons (1776-1844; bone necrosis); J. L. Smith (1818-1883; natural science); A. G. Tebault (1811-1895; medicine); T. G. Thomas (1831-1903; gynecology); H. H. Toland (1806-1880; surgery); E. B. Turnipseed (1829-1883; surgery); John Wagner (1791-1841; surgery); Eugene Wasdin (1859-1911; surgery).

Tennessee: G. S. Blackie (1834-1881; cretinism); W. T. Briggs (1828-1894; epilepsy); S. M. Burnett (1847-1906; ophthalmology); J. H. Callender (1832-1896; neuropsychiatry); W. H. Deaderick (1773-1858; removal of lower jaw bone); Richard Douglas (1860-1908; surgery); P. F. Eve (1806-1877; surgery); J. A. Murphy (1824-1900; materia medica); David Nelson (1793-1844; surgery); W. M. Polk (1844-1918; gynecology); A. P. Vance (1854-1915; orthopedics); A. G. Walter (1811-1876; surgery); E. T. Wilkins (1824-1891; psychiatry); D. W. Yandell (1826-1898; surgery).

Virginia: J. M. M. Ambler (1849-1881; Arctic expedition); G. W. Bagby (1828-1883; writer); William Baynham (1749-1814; ectopic pregnancy); A. N. Bell (1820-1911; "The Sanitarian"); Benjamin Blackford (1834-1905; medicine); Lawrence Bohune (——1622; pioneer); D. R. Brower (1839-1909; neuropsychiatry); C. E. Brown-Sequard (1817-1894; neurology); W. A. Byrd (1843-1887; appendectomy); J. L. Cabell (1813-1889; "The Testimony of Modern Science to the Unity of Mankind"); William Cabell (1700-1774; medicine); J. E. Chancellor (1826-1896; anatomy); Nathaniel Chapman (1780-1853; founded Medical Institue of Philadelphia); J. H. Claiborne (1828-1905; physician); John Clayton (1693-1773; botany); James Cocke (1780-1813; anatomy); William Cocke (1672-1720; practitioner); Joshua Cohen I (1801-1870; otology); R. T. Coleman (1830-1884; obstetrics); J. E. Cooke 1783-1853; universal origin of disease); W. D. Cooper (1820-1897; physician); E. F. Cordell (1843-1913; medical history); James Craik (1731-1814; Physician General, U. S. Army); J. S. D. Cullen (1832-1893; surgery); F. D. Cunningham (1836-1885; ophthalmology); W. C. Dabney (1849-1894; obstetrics); J. S. Davis (1824-1885; anatomy); E. C. Dick (1762-1825; medicine); Bennet Dowler (1797-1879; physiology); Henry Draper (1837-1882; celestial photography); J. C. Draper (1835-1885; chemistry); J. W. Draper (1811-1882; chemistry and physics); W. B. Drinkard (1842-1877; ophthalmology); Robley Dunglison (1798-1869; physiology); L. B. Edwards (1845-1910; materia medica); J. P. Emmet (1796-1842; natural science); Thomas Ewell (1785-1826; gastric secretions); A. M. Fauntleroy (1837-1886; medicine); W. S. Forbes (1831-1905; anatomy); A. D. Galt (1777-1841; medicine); J. M. Galt (17——1808; medicine); J. M. Galt II (1819-1862; psychiatry); A. Y. P. Garnett (1820-1888; surgery); C. B. Gibson (1816-1865; anesthesia); George Gilmer (1742——; medicine); S. C. Gleaves (1823-1890; surgery); Corgin Griffin (——1813; surgery); Joseph Hartshorne (1779-1850; surgery); John Hole (1754-1813; vaccination); Robert Honyman (1752-1824; surgery); W. D. Hooper (1843-1893; medicine); G. B. Horner (1761-1815; epidemic influenza); W. E. Horner (1793-1853; anatomy); R. M. Huston (1795-1864; obstetrics); M. L. James (1829-1907; medicine); W. C. Jarvis (1855-1895; rhinolaryngology); G. B. Johnston (1853-1916; surgery of kidney and spleen); Walter Jones (1745-1815; medicine); Levin Joynes (1819-1881; President A.M.A. 1858); A. F. A. King (1841-1914; malaria); H. G. Latham (1831-1903; surgery); Thomas Lawson (1795?-1861; surgery); Arthur Lee (1740-1792; politics); John Leigh (1769-?; opium); J. B. Luckie (1833-1908; surgery); J. B. McCaw (1823-1906; surgery); T. B. McClintic (1873-1912; public health); James McClurg (1746-1823; surgery); H. H. McGuire (1801-1875; repair of club foot); H. H. McGuire II (1835-1900; surgery); James May (1798-1873; medicine); Robert Mayo (1784-1864; medicine); Hugh Mercer (1725-1777; medicine); J. P. Mettauer (1787-1875; vesico-vaginal fistula); John Mitchell (1680?-1768; botany and electricity); J. K. Mitchell (1793-1858; chemistry); Russell Murdock (1839-1905; ophthalmology); T. D. Mütter (1811-1859; plastic surgery); G. A. Otis (1830-1881; surgery); William Owen (1788-1875; obstetrics); W. O. Owen (1820-1892; surgery); M. M. Pallen (1810-1876; obstetrics); W. W. Parker (1824-1899; surgery); John Pott (——1652; medicine); G. J. Preston (1858-1908; neurology); R. J. Preston (1841-1906; psychiatry); Joseph Price (1853-1911; gynecology); W. R. Pryor (1858-1904; vaginal hysterectomy); R. L. Rea (1827-1899; surgery); T. A. Reamy (1829-1909; obstetrics); Walter Reed (1851-1902; yellow fever); L. C. Rives (1790-1870; obstetrics); P. K. Rogers (1776-1828; chemistry); E. W. Row (1833-1900; surgery); William Selden (1808-1887; medicine); W. B. Selden (1773-1849; decapitation of fetus); Alexander Somervail (1758-1823; medicine); P. C. Spencer (1793-1860; lithotomy); Adam Stephen (——1791; operation for abscessed liver); F. C. Stewart (1815-1899; surgery); F. T. Stribling (1810-1874; psychiatry); J. T. Temple (1803-1877; homeopathy); John Tennent (1715?-1760?; seneca for pleurisy); G. H. Torney (1850-1914; Surgeon General, U. S. Army); W. B. Towles (1847-1893; anatomy); W. H. Triplett (1836-1890; surgery); D. H. Tucker (1815-1871; medicine); G. L. Upshur (1822-1855; medicine); Thomas Walker (1715-1794; bone trephine for osteomyelitis); B. R. Wellford (1797-1870; materia medica); Robert Wellford (1753-1823; surgery); W. R. Whitehead (1831-1902; mouth gag).

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The Correlative Method of Teaching the History of Medicine

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In schools presenting courses in medical history, two teaching methods are conventionally employed. The first of these, which is used by institutions having a more formal type of instruction, is to cover in the course of a trimester, semester or a year, the field of medical history as a whole, using as a textbook a work such as Garrison. The course is often delivered to the freshman and is divided into chronological periods rather than subject matter. The student is confronted with a vast array of technical medical terms of which, as yet, he knows nothing. The second method employed is to have a number of speakers present a limited number of topics throughout the year to some special group, again, often the freshman. The course may be conducted as a seminar in which members of the student body prepare indifferent biographies of obscure personages, or it may be conducted by members of the faculty benignly reminiscing on widely divergent topics. In either case the grave difficulty with this method is its lack of central theme.

It is obvious that neither of these approaches supplies the student with a proportionate amount of information about each of the medical subjects which appear in his curriculum. The ideal plan is one which will present to freshmen the developmental story of only the subjects with which he is immediately concerned. It is obviously a waste of time to go into the details of the history of surgery or obstetrics with students who have no knowledge, as yet, of the nomenclature of these fields. This plan is one which resumes the unfolding of the medical story as the student progresses from topic to topic and from year to year.

The obvious question which will present itself to the mind of the experienced is how such a plan can avoid the problem of reduplication. Anatomy and physiology were not disparate subjects before the 17th century, the history of physical diagnosis overlaps the history of medicine, and so forth. How is this problem to be met?

This problem is more apparent than real. Such physiology, for example, as was developed prior to the 17th century entails no special technical information and can easily be understood by a person of average intelligence who has had no instruction in physiology whatsoever. It may therefore be conveniently included with the history of anatomy. In the case of physical diagnosis, the history of this subject can be taught prior to the time the student knows very much about medicine because it is based more on anatomy, physiology and physical principles than on medical concepts. Just as such a subject often occurs in the medical curriculum prior to medicine, so its history may be considered separately and apart from the history of medicine as a whole. The reader will now object that

while what has been said is perfectly true and while, with a little intelligence, similar difficulties of overlapping may be avoided between other subjects, the question of biographical repetition has not yet been touched on. The answer to this question is extremely simple. Biographical repetition, on the whole, is to be encouraged and is an advantageous feature of this system of teaching medical history. It provides the student with a feeling of familiarity, such as one experiences on reunion with old friends, and affords him a certain insight into the versatility of the great minds of medicine.

Due to the fact that the most is made of the time employed, the actual demand made on the student, as far as the total curriculum is concerned, is generally no greater than that entailed by any other technique. Whether the instructor chooses to require the student to prepare papers or write an examination is a matter of personal preference. It has been our own policy to avoid the former practice entirely since it is primarily adapted only for biographical studies. What we have been interested in has been the development of an understanding of concepts and trends and not the memorization of the bizarre facts in the warped lives of a few eccentrics. Whether or not examinations should be given is a question to which we have not found the answer. Attendance on the courses, as conducted under this plan, has been uniformly good and no examinations have been given, but should attendance or interest flag, the threat of an imminent examination might always be employed to bring about a simulation of interest.

A plan of this type should be carried out ideally by a single teacher. In this way, the correlative factor may be kept at a maximum and the transition from subject to subject can be made practically imperceptible. However, by the use of a plan such as this, attention should be directed to the fact that instruction in medical history may be instituted in such schools which do not give instruction at the present time in this subject, by the simple expedient of requesting the various heads of departments to confer on the matter of delivering a limited number of lectures in their respective fields. Many men, notably those in the preclinical sciences, are at the present time, including brief historical references in the courses which they teach. If a uniform front be adopted by the administration of an institution and these desultory efforts be correlated into a concerted plan, successful instruction in medical history can be immediately instituted in such medical colleges as are financially unable to create a separate Department of Medical History. A textbook on medical history, designed to facilitate instruction of this type is under preparation by the author.

The plan which has been employed at the University of Georgia School of Medicine during the past two years is given below. It is obvious that with a few judicious changes it would be a simple matter to draw up a similar plan which would fit the needs of practically any institution in the United States.

FIRST YEAR: Anatomical Sciences, (Anatomy, Histology, Embryology and Neuroanatomy), and Physiology.

SECOND YEAR: Biochemistry, Pharmacology, Materia Medica and Anesthesia.
Pathology.
Bacteriology and Public Health.
Physical Diagnosis.

THIRD YEAR: Medicine (General, Endocrinology, Tuberculosis).
Pediatrics.
Neurology and Psychiatry.
Ophthalmology.
Dermatology.
Syphilology (and Venereology).

FOURTH YEAR: Surgery (General, Orthopedic, Plastic; Otology, Rhinology, Laryngology).
Neurosurgery.
Roentgenology.
Obstetrics and Gynecology.
Urology.
Medical Jurisprudence and Ethics.

Lugubriosity

There lived a man near Bannockburn
Who said that man is made to mourn,
This may be true to some degree,
To more than that none should agree.

He, like weeping Heraclitus,
Sees much sorrow 'round about us,
Poor, but proud and pessimistic,
Sad condition in a mystic.

There is a time for everything,
For peasant boy as well as king,
A time to dance, a time to mourn,
And everything should take its turn.

But there is room for honest doubt
Concerning things some mourn about,
For those who mourn too much are well
Along the way to psychic hell.

To mourn too much is luxury
That's based on poor philosophy;
The man who thinks he's made to mourn
Is one whom wiser men will spurn.

Better be like Democritus,
See life not grim but humorous,
When you laugh the world is with you,
But when you weep your friends are few.

Life can be an empty bubble
Blown by mental doubts and trouble,
Most of which are real never,
But mere ghosts of conjured error.

One must learn his load to carry,
When to mourn, when to make merry,
And like a stoic, smile at fate,
As part of life, and man's estate.

H. A.

Normal X-Ray Anatomy: The Principles and Methods of a Preclinical Course

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To an ever increasing extent is anatomy, the oldest medical science, utilizing roentgenology, one of the latest additions to the medical armamentarium. A recent article by E. P. Pendergrass[1] shows to what extent and with what underlying purpose in mind the medical schools of the U. S. and Canada have made use of this method in their instruction in anatomy. The time allotted for this study per semester varies from one or two lectures and few fluoroscopic examinations in some schools to special courses of more than fifty hours in others. Some of the most renowned schools do not list any x-ray instruction during the first and second years. Very few two year schools apply roentgenology to the teaching of anatomy. Schools which have given little recognition to radiological methods in the past now feel an increasing need for such methods in the teaching of preclinical courses. Unfortunately, Pendergrass had not enough information to present a comprehensive survey of the methods used. But one probably is justified in assuming that these methods vary as much as the time allotted for the course. While uniformity of methods may not in itself be desirable, the experience of those teaching radiological anatomy should be exchanged and added to the scanty reports in the literature (Bardeen[2]; Hasselwander[3]; Hickey[4]; Bardeen[5]; Goldhamer[6]; Forssell[7]; Batson[8]; Pendergrass[9]).

Following are the reasons which impelled us to introduce a required course in x-ray anatomy in the first semester of the sophomore year. The first year study in gross anatomy has given the student the necessary foundation on which to build a course presenting facts and exemplifying certain basic principles of anatomy in a wholly new light. While his work in the dissecting room has already brought before the student the problem of variation, his awareness of its significance is more or less a matter of chance, depending on the extent of variation in his material. The subsequent course in x-ray anatomy can vitalize the problem of variation as the basis of evolutionary change, by presenting it in a prearranged and systematic way. Huntington's[10] article on modern problems

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2. Bardeen, C. R.: The value of the roentgen-ray and the living model in teaching and research in human anatomy. Anat. Rec., 14:337-340, 1918.
3. Hasselwander, A.: Die Bedeutung des Roentgenbildes für die Anatomie. Ztschr. f. d. ges. Anat., Abt. 3, 23:535-668, 1921.
4. Hickey, P. M.: The teaching of x-ray anatomy. Act. Radiol., 6:577-582, 1926.
5. Bardeen, C. R.: The use of radiology in teaching anatomy. Radiology, 8:384-386, 1927.
6. Goldhamer, K.: Roentgenologie in der Anatomie. Ergebn. d. Anatomie u. Entwicklungsgeschichte, 30: 420-468, 1933.
7. Forssell, G.: Teaching and training in medical radiology. Act. Radiol., Suppl. 4, pp. 145-230, 1930.
8. Batson, O. V.: Correlating anatomy and roentgenology. Radiology, 22: 49-53, 1934.
9. Pendergrass, E. P.: Experiences in teaching radiology to undergraduate students. J.A.M.A., 109:634-637, 1937.
10. Huntington, G. S.: Modern problems of evolution, variation and inheritance in the anatomical part of the medical curriculum. Anat. Rec., 14: 359-445, 1918.

of evolution, variation and inheritance in the anatomical part of the medical curriculum illustrates, in a masterly way, this type of presentation. His discussion of the entepicondylar foramen of the humerus in vertebrates and its occasional manifestation as a supracondylar process in man may serve as an example of this approach. Variations in the arrangement of the spinal column will afford a chance to demonstrate the fact that evolutionary processes have not yet come to a standstill and will permit the student to draw his own conclusions as to the validity of arguments on diverse trends of evolution.

The course in x-ray anatomy brings to the student's attention differences in type of body build and their relation to variations in shape, position, size, tonus and activity of the viscera (Mills[11]), which information he cannot, for obvious reasons, hope to gain from the cadaver. It will also give the student a broader concept of the "normal," a concept which has been little, if at all, developed by his study of anatomical textbooks, but which is so important for his clinical work. This is especially true for the skull whose individual variations are not sufficiently stressed in textbooks. The different degrees of pneumatization of the paranasal sinuses and the petrous bone and their influence on the shape of the skull, on surgical approaches and on the course of disease, can easily be pointed out on the x-ray material at hand. Anthropological facts (Batson[8]) and anthropometric (Pacini[12]) procedure may well be discussed in connection with the x-ray anatomy of the skull. Demonstrations of supernumerary bones in the hand and foot may afford an opportunity to touch on the theoretically interesting and difficult problem of progressive and retrogressive variants and to stress the practically more important problem that a considerable number of supernumerary bones described by anatomists in the pre-roentgen era are apparently of traumatic origin (Grumbach[13]).

The topic of development and growth can best be illustrated by the use of roentgenograms. While in the old type of anatomical teaching the subject of embryologic osteology and post-natal development of the skeleton has usually been neglected, the course in x-ray anatomy affords time and method to supplement our anatomical teaching in this respect. The order of epiphyseal union as the best indicator for the determination of age is discussed and the influence of race, nutrition and the endocrines on skeletal maturation is pointed out (Hasselwander[3]; Pryor[14]; Stevenson[15]; Harris[16]; Todd[17]). By visualizing skeletal changes which can be demonstrated roentgenologically even after conclusion of the growth period, the student will realize that bone is not an inert mass, but takes part in all vital processes of the body and that the skeleton is an organ as responsive to physiologic and pathologic changes as any other organ in the

11. Mills, R. W.: The relation of bodily habitus to visceral form, position, tonus and motility. Am. J. Roentgenol. & Rad. Therapy, 4:155-169, 1917.
12. Pacini, A. J.: A system of roentgen ray anthropometry (the skull). J. Radiol., 3:322-331, 1922.
13. Grumbach, A.: Das Handskelett im Lichte der Roentgenstrahlen. Vienna & Leipsig. 1921.
14. Pryor, J. W.: Differences in the time of development of centers of ossification in the male and female skeleton. Anat. Rec., 25:257-273, 1923.
15. Stevenson, P. H.: Age order of epiphyseal union in men. Am. J. Physical Anthropol., 7:53-93, 1924.
16. Harris, H. A.: Bone growth in health and disease. London. 1933.
17. Todd, T. W.: Atlas of skeletal maturation. St. Louis. 1937.

body (Lachmann and Whelan[18]). Thus, it is possible to correct any wrong conceptions which the student may have acquired from his study of dry bone specimens.

Even more urgently another subject requires attention: the topographical anatomy of the viscera. Here studies of the dead body and of textbook descriptions are especially apt to produce faulty ideas. "The pre-Listerian surface markings are still current in most textbooks and in some of the schools of anatomy . . . " "The last thing he (the surgeon) is justified in accepting is that he will find the viscera arranged according to the surface markings" (Barclay[19]). It is only necessary to point to the transpyloric plane which in the anatomical position of the living body almost never marks the site of the pylorus. Where, as in the latest editions of most of the current anatomical textbooks, the findings of radiological examinations of the stomach in the living have been taken into consideration, they are often given as an appendix, inadequately correlated with the preceding discussion on the anatomy of the stomach, as if it were necessary for the student to study two anatomies, that of the cadaver and that of the living body as presented by x-ray. As Barclay,[19] one of the foremost advocates of radiology in the teaching of visceral anatomy, has pointed out: "It is easy to teach the descriptive anatomy of the dead abdomen, but extraordinarily difficult to give students an adequate idea of the fluid anatomy of the living subject."

Moody [20] and his co-workers and others have shown the great variability of form and position of the stomach depending on sex, habitus, posture, tonus and state of filling of the stomach and the organs in its neighborhood. What has been said about the stomach holds true, to a certain extent, also, for other abdominal viscera, such as the colon, liver, gallbladder, appendix and kidneys. False notions regarding positions and mobility of these organs especially the stomach, cecum and kidney have caused many unnecessary operations. The subject of topographical anatomy of the heart and diaphragm lends itself very readily to this dynamic presentation by fluoroscopy. The effect of physique, posture and respiration on form and position of these organs should be demonstrated under the fluoroscope. The observation of the heart under these conditions gives also a unique opportunity to study structure in action and to bring into discussion the physiological viewpoint. This serves to reunite two preclinical sciences whose separation is at best artificial. Other opportunities to study the body as a working unit are afforded by demonstration of the mechanism of respiration and deglutition, of gastric and intestinal motility, of gallbladder function and joint action.

It is not within the scope of this paper to point out the value and extent to which radiology has been utilized in anatomical research. This subject has been covered ably by Bardeen,[3] Hasselwander,[5] Goldhamer[6] and Woollard.[21] Only in so far as these new conceptions have been introduced into our teaching have

18. Lachmann, E., and Whelan, M.: The roentgen diagnosis of osteoporosis and its limitations. Radiology, 26:165-177, 1936.
19. Barclay, A. E.: The digestive tract: a radiological study of its anatomy, physiology and pathology. New York. 1933.
20. Moody, R. O., Van Nuys, R. G. and Kidder, C. H.: The form and position of the empty stomach in healthy young adults as shown in roentgenograms. Anat. Rec., 43:359-379, 1929.
21. Woollard, H. H.: Recent advances in anatomy. Philadelphia. 1927.

they been or will they be discussed. As a borderline topic, we attempt to present to our students the fundamental investigations undertaken by Forssell[22] on the anatomy and function of the mucosa of the gastro-intestinal tract. Forssell demonstrated that studies on the mucous membrane of the digestive tube of dissecting room material produce false impressions. Here, we find the mucosa often devoid of folds, variously due to autodigestion and to relaxation of the muscularis mucosal. By examining the stomach roentgenologically during life and directly after death, but before local death occurred, he was able to study the rugae of the mucosa. The results of his investigations were not in accord with orthodox anatomical opinion. Most anatomical presentations of this subject assume that the relief of the mucosa has arisen either through constant anatomically preformed folds, as e.g. the plicae circulares (valvulae conniventes) of the small intestine, or has been brought about through a passive folding in of the mucosa by contraction of the muscular coat (muscularis propria). Contrary to these concepts, Forssell convincingly summarized the results of his investigations by stating that the relief of the mucous membrane of the digestive canal is formed independent of the contraction of the muscular coat. While there are typical configurations of the rugae for certain portions of the gastro-intestinal tract, we must see in the mucous membrane a plastic organ which changes its arrangement in response to the needs of digestion. These changes are brought about by two agencies: the action of the muscularis mucosal with its nervous regulating mechanism (Meissner's plexus) and by variations in the fluid contents of the folds. Forssell's observations have been uniformly confirmed and his conclusions have been generally accepted with few dissentions.[23] But Forssell's teaching, although well known amongst roentgenologists, has scarcely been mentioned in anatomical presentations of the subject. Based on Forssell's study of the intestinal mucosa, continental radiologists have developed a new method of examination of the digestive tube. By coating the viscus under observation with only a thin layer of opaque medium, the mucous membrane is visualized and the finer pathology may be demonstrated. The course in x-ray anatomy should give the underlying principles and fundamentals of this method.

This leads to the final, and not the least important, reason for introducing this course. The catalogues of almost all schools show that the student in the last years of his medical training is required to take a course in clinical roentgenology. Naturally, this course will be concerned mainly with pathological conditions. There will not be sufficient time to teach even the elements of radiographic appearance of normal living structures. This latter is what our course attempts to give in a systematic way, as may be seen from the schedule below.

We do not try to cover the general physics of x-ray nor the technique of radiological examination, but great stress is laid on presentation of the laws governing production of x-ray images. Diagrams and roentgenograms of models are shown illustrating these laws. Their practical importance is demonstrated

22. Forssell, G.: Ueber die Beziehung der Roentgenbilder des menschlichen Magens zu seinem anatomischen Bau. Beit. z. Anatomie u. Physiologie des Magens. Hamburg. 1913.
23. The Cole Collaborators: Radiologic exploration of the mucosa of the gastrointestinal tract. Saint Paul & Minneapolis. 1934.

by examples. In the beginning, the student experiences great difficulty in mastering these applications of roentgen optics. Actual sections of bones are exhibited together with roentgenograms of these sections, then roentgenograms of superimposed sections are presented. Thus the student is made aware of the fact that skiagrams are summation pictures which require discerning analysis. The influence of the two structural elements composing bone, the cortex and spongiosa, is discussed and demonstrated by films (Lachmann[24]). Since the understanding of summation and subtraction effects is so important in the analysis of the roentgenogram of the lung, they are illustrated by model experiments. Thus, the student is gradually trained to interpret his observations on differences in density in terms of the underlying anatomical substrate.

The course is given as a required course in the first semester of the sophomore year. Thirty-eight (38) hours are provided and these are taken up by lectures illustrated by slides, by film and by fluoroscopic demonstrations. The latter are given to groups of eight students. Each group attends the fluoroscopic demonstrations twice during the semester, once for the study of the thorax and various joints and once for the gastro-intestinal tract. The students subjected to the examinations alternate and the gastro-intestinal tract is demonstrated in various students during ingestion of the barium meal, and at intervals of one-half hour, four hours, and twenty-four hours after the meal, this having been taken by students in advance of the demonstration, so that all parts of the digestive tube, from pharynx to rectum, are visualized. The objects are examined in different positions on a fluoroscope, which permits changes from the vertical to the Trendelenburg position.

While one group receives its fluoroscopic demonstrations, the others have an opportunity to study, in a separate room, exhibits of films with detailed written explanations. In the same room are also displayed appropriate models, specimen, diagrams and literature pertaining to the subject under discussion. These exhibits are correlated with the program of the lectures and are changed frequently. The students are given to understand that these exhibits are an integral part of the course. The following table shows the number of lecture periods and slide demonstrations for each topic listed.

X-ray optics	3 periods	Lower Extremity	3 periods
Thorax and Diaphragm	6 periods	Spinal Column	3 periods
Gastro-Intestinal Tract	6 periods	Skull	3 periods
Urogenital Tract	2 periods	Ventriculography, Encephalography, Myelography	1 period
Skeleton: General Discussion	2 periods		
Upper Extremity	3 periods		

Three or four short tests during the semester and a comprehensive final examination serve to gauge the progress of the students. Satisfactory textbooks for the course, as we give it, are not available.

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24. Lachmann, E.: The roentgen anatomy of the knee joint: an experimental analysis. Radiology, 29:455-571, 1937.

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Correlation of Accomplishment in Arts College and Medical College

Each year the Association of American Medical Colleges makes a study of the correlation of the accomplishment of the freshman medical students in all the medical colleges of the United States with their scholastic standing in the arts college.

The problem concerns the standing in class by thirds — upper, middle and lower. For the academic year 1938-1939, there was a change for the better so far as the middle and lower thirds are concerned, especially in the failures of promotion. The upper third remained fairly stationary. The results for this group were: Clear—51.4 per cent remained in the upper third; 28.9 per cent fell to the middle third; 14.9 per cent fell to the lower third; 2.4 per cent failed and 2.3 per cent withdrew.

Of the students in the middle third in college with clear records in medical college, 20.2 per cent were in the upper third in medical college; 37.8 per cent remained in the middle third; 7.2 per cent failed, 3.0 per cent withdrew.

Of the students in the lower third in the arts college who had clear records in the medical college, 11.5 per cent made the upper third; 28.0 per cent were in the middle third; 42.8 per cent remained in the lower third; 14.9 per cent failed and 2.7 per cent withdrew. For the academic year 1937-1938, 21.6 per cent of this group failed; 8.4 per cent made the upper third. This group, as a whole, did much better in 1938-1939 than in 1937-1938. They may have been better scholastically or, the selections made by admission committees may have been made more carefully. It should be remembered, in this connection, that a much smaller number of applicants with less than three years of college work were accepted and that the number of applicants presenting a bachelor's degree was larger than in preceding years, although, as all are agreed, the bachelor's degree, in itself, is not a criterion of a better quality of scholarship. The accomplishment of the students who had less than three years of college work is comparable with that of the students with more years of preparation. Of course, selections from this group are made with great care, and, on the basis of results, are fully justified. Selection based on scholarship, the character and ability of the applicant, and other aids employed by admission officers, such as the medical aptitude tests, personal interviews, etc., gives the best results.

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Graduate Training in Hospital Administration

The field of hospital administration offers many attractive opportunities as a career. A course in hospital administration for graduate students is offered by the School of Business of the University of Chicago in cooperation with the American College of Hospital Administrators. The course is open to students who hold a bachelor's degree or the M.D. or D.P.H. degrees and who have the personal qualifications necessary for success in administrative work. Enrolment is limited to eight students. They may register as candidates for the Master of Business Administration or the Ph.D. degree—or without reference to a degree. Most students will require not less than four quarters in residence; for some students, three quarters may suffice. Continuation beyond the first quarter is contingent on satisfactory performance. No student will be admitted who does not intend to remain for at least three quarters.

For the encouragement of students of the right type, a number of scholarships are available. They cover tuition and, in a few cases, a moderate allowance for living expenses.

The tuition fee is $100 a quarter. Expenses per quarter are estimated at a low of $159 and a high of $380. Clothing, travel, medical expense and recreation are not included in these estimates.

For further information, address the Director, Hospital Administration Course, School of Business, the University of Chicago, Chicago, Illinois.

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Graduates of 1939

The graduates of 1939, approximately 5,100 in number, comprised students who entered on the study of medicine in 1935 and preceding years—as far back as 1920. The freshman class of 1935 numbered 6,352 students. Of that number, 1,281 dropped out, most of them at the end of the freshman year. A few of these students will, as in previous years, return to college to continue their studies.

Of the 1939 graduates, 82.4 per cent entered medical college in 1935; 10.0 per cent entered in 1934. The majority of this group were repeaters. Three per cent entered in 1933. In this group there were also many repeaters. Eighty-six graduates entered in 1936 and completed their work in three calendar years.

The date of entrance of other graduates was as follows: 1932—33; 1931—10; 1930 and 1929—6 each year; 1928—2; 1927—1; 1926 and 1925—2 each year; 1920—1. Thus, 17.6 per cent of the 1939 graduates entered on the study of medicine in other years than 1935.

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Educational Qualifications of Health Officers

The following report on the educational qualifications of health officers was approved by the Governing Council of the American Public Health Association, October 18, 1939, on recommendation of the Committee on Professional Education.

The type of training most desirable for an individual seeking to become a health officer is well recognized. He should have had fundamental training in the sciences and the humanities at least equivalent to that required for a college degree in Arts or Science. He should have completed the course leading to the degree of Doctor of Medicine in a recognized medical school, and should have had at least one year of internship in an approved general hospital, including a communicable disease service. In addition to such internship the candidate should be given a preliminary period of supervised field experience in a well organized department of health for a period sufficient to give him acquaintance with the general aspects of public health, and to give him also opportunity to determine something of his own liking for the work and his fitness for it. At the end of this preliminary field experience the candidate should receive at least one full academic year of graduate instruction in public health in a university. If possible the candidate should have an additional year of practical experience in a subordinate position before becoming himself responsible for the conduct of the work of a department of health.

However desirable so complete a course may be, it is impracticable at this time to insist that all candidates for appointment comply with these requirements. In view of this practical situation, some modification may temporarily be made in the direction of recognizing the value of practical field experience obtained under competent supervision as in some measure substituting for formal education.

Certain individuals not possessing a medical degree have achieved success as administrative health officers. It is reasonable therefore, that the basic training represented by the medical degree, although advisable, need not necessarily be considered absolutely essential in the selection of health officers for jurisdictions where the duties of the health officer are mainly administrative, provided the candidate possesses an adequate general and biological education, has re-

ceived not less than 2 academic years of graduate instruction in public health, and has had one or more years of administrative experience in some position in a recognized health organization as prerequisite for the duties of health officer.

Because of the unmistakable trend upon the part of governmental bodies to insist upon the medical degree as a prerequisite to appointment as health officer, and because it is impossible to foresee whether the prospective health officer will be located in a health department where his duties are restricted to administrative functions, it is inadvisable to encourage the candidate for a public health degree to look forward to a career as health officer unless he is also the possessor of a medical degree, and for these reasons our recommendations contain no reference to the nonmedical health officer.

RECOMMENDATIONS

1. That candidates for appointment as health officer should be graduates of approved medical schools who have completed successfully not less than one year of internship in an approved hospital and, in addition, a course of not less than one year of graduate instruction in a university, leading to a degree in public health.*

2. That recognition be given to the fact that practical experience in public health administration is an essential part of the education of a health officer and that great achievement can usually be attained only after long experience. These facts should always be taken into consideration in the selection of health officers, particularly where the position is one of great administrative responsibility.

The above recommendations are made for the future guidance of officials responsible for the appointment of health officers, and for the guidance of individuals looking forward to careers in public health. In making these recommendations, the American Public Health Association expressly recognizes the professional standing of persons now performing creditable service as health officers.

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Student Health

What do students think about a health service? The following thoughts are voiced by a student editor at the University of Buffalo.

"In the past few decades, gleaming edifices have sprung up and great libraries have been built to proclaim the elegance of our educational progress. No one will deny that the Universities have gone far in fulfilling their obligation to society. Yet in one fundamental responsibility these fine institutions have been sadly negligent, . . . the responsibility for student health.

"It is true that fine gymnasiums have been provided for those who are healthy enough to use them; that periodic physical examinations may be given to determine whether a student is healthy enough to carry out his curriculum; that warm dormitories and clean dining halls may be made available. But once a student becomes ill he is thrown out upon his own resources.

"In our own professional schools we are given a Mantoux. But if we need a chest x-ray we must pay the Meyer Memorial Hospital three dollars for it. A student had his appendix removed by a surgeon who was kind enough not to charge him for it. Yet the anesthetist and the General Hospital charged full rates for their services. Another student was hospitalized for coryza for a couple of days at the General Hospital. He too had to pay full hospital rates in addition to ten dollars for 'laboratory tests' by the physician. The fault is not with our own hospitals alone for such incidences are the rule rather than the exception throughout the country. Yet large in-

*Where lack of qualified personnel makes it impossible to require a full year of graduate instruction in public health, the postgraduate requirements considered temporarily as applicable for medical health officers for small jurisdictions may be: the satisfactory completion of not less than three months of postgraduate instruction in public health in a university, and not less than three months of supervised field experience in a well organized health department. Such individuals should be required to complete the course leading to a graduate degree in public health as soon as they have demonstrated ability sufficient to warrant such instruction.

dustries provide doctors, nurses, medicines and hospitals for their workmen and their families.

"The medical economist will immediately ask how we would propose to construct a health plan. We have no immediate solution, for in such matters we must humbly confess ignorance. Yet the need for a plan is so great that it demands expression.

"Tuberculosis constitutes a special health problem in itself. It takes its annual toll of students in every class. Yet positive Mantous go on without periodic x-ray or follow-up because of the cost involved. Influenza lurks grimly in the consciousness of every student. Consider the out-of-town student who would have to spend several weeks in a hospital with pneumonia.

"How would we finance all this and more? Again we must confess that we do not know. We feel that the medical senior in the hospital, and the dental student in the clinic perform useful and valuable services for these institutions and for society. These services are given freely and whole-heartedly. It is only fair that these students be given special consideration when they are sorely in need of it."—EDITORIAL: *The Medentian*, University of Buffalo, January, 1940.

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Directory of Specialists

The Advisory Board for Medical Specialists announced that a *Directory of Medical Specialists* would be published in December, listing the more than 16,000 specialists who have been certified by the special boards. There will be three sections: a description of the Advisory Board for Medical Specialties; a section describing the individual boards and listing their diplomates; and an alphabetical list of the diplomates of all boards. It is expected that the directory will be issued every two years. Subscriptions at $3.50 the copy may be made through the Columbia Press, 2960 Broadway, New York, or through the office of the directing editor, Dr. Paul Titus, 1015 Highland Building, Pittsburgh.

College News

University of Pennsylvania
School of Medicine

Grants amounting to $132,559 for scientific research in various fields of medicine have been received. Contributors are: the Commonwealth Fund, the Rockefeller Foundation, National Tuberculosis Association, National Committee on Mental Hygiene, Nemours Foundation, International Cancer Research Foundation, Estate of George S. Cox and four well known manufacturing concerns.

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Harvard Medical School

Dr. Clarence G. Lane has been promoted to be clinical professor of dermatology and Dr. Francis R. Dieuaide to be associate professor of medicine.

A research fellowship in the laboratory of pathology at the Collis P. Huntington Memorial Hospital and in the department of pathology at the Harvard Medical School will be available September 1. It carries a stipend of $3,000 and may be renewed for a second year. The fellow will be expected to devote most of his time to histologic and cytologic studies of the effects of radiation of different types on normal and pathologic tissue. Application should be addressed to Dr. Shields Warren at the Collis P. Huntington Memorial Hospital, Boston.

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Western Reserve University
School of Medicine

The John and Mary R. Markle Foundation has made a grant of $6,000 in continuation of the investigations of Dr. Claude S. Beck, associate professor of surgery, on methods of revascularizing the heart after coronary obstruction.

A grant of $1,250 has been received from the National Research Council to support from January 1 to June 30, 1940, a study of human ovulation under the direction of Dr. William W. Greulich, professor of physical anthropology and anatomy and director of the Brush Foundation.

Dr. B. Holly Broadbent, director of the Bolton Fund, presented the portrait of Dr. Todd to the Department of Anatomy on Dr. Todd's birthday, Monday, January 15, at 4:30. Dr. Todd was professor of anatomy at Reserve and director of the Brush Foundation.

President Winfred G. Leutner accepted the portrait, Dr. Normand L. Hoerr spoke of its hanging in the Library of Anatomy, and Dr. Frederick C. Waite gave a brief history of the memorial portraits in the School of Medicine. The artist who painted Dr. Todd's picture is Dr. Erich von Baeyer, Fellow in Roentgenology of University Hospitals.

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Medical College of Virginia

Dr. G. H. Ghermann, Medical Director of the E. I. DuPont de Nemours Company, and Dr. John H. Foulger, Director of the Haskell Laboratory of Industrial Toxicology of the duPont Company, have been appointed associate professors of industrial health. Dr. W. L. Weaver of the duPont plant at Ampthill has been appointed instructor in industrial health. The appointments are a part of a program for the expansion of the college's course in industrial health.

The annual Stuart McGuire lectures are scheduled for April 16 and 17, 1940. Dr. C. Frederic Fluhmann, Associate professor of obstetrics at Stanford University, will give two lectures, one on Anesthesia and Analgesia in Obstetrics and a second on the problem of abnormal uterine bleeding.

A portrait of Dr. Alfred L. Gray, late professor of roentgenology and formerly dean at the Medical College of Virginia, Richmond, was presented to the college December 15 by Mrs. Mal-

colm W. Perkins, a niece of Dr. Gray. Drs. Thomas W. Murrell and William Lowndes Peple, Richmond, were the speakers at the ceremonies. Dr. Gray, who died Oct. 13, 1932, was associated with the college and with the old University College of Medicine for many years as dean of the latter, professor of physiology and professor of roentgenology.

The dedication of the restored, historic Egyptian Building of the College took place on January 16th. Addresses were delivered by Dr. Walter H. Judd, distinguished student of Chinese culture, on "Chinese Medicine;" Dr. Wyndham B. Blanton, associate professor of medicine, Medical College of Virginia, on "The Place of the Egyptian Building in Medicine;" Dr. George W. Thorn, associate professor of medicine, Johns Hopkins University School of Medicine, on "Studies of the Adrenal Cortex;" Dr. E. V. McCollum, professor of biochemistry, Johns Hopkins University School of Hygiene and Public Health, on "The Place of Vitamins in the Maintenance of Normal Health."

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University of Vermont
College of Medicine

Dr. Frank H. Lahey, head of the Lahey Clinic in Boston, Mass., was the first speaker of 1940 for the Osler Clinical Society of the University of Vermont College of Medicine. Doctor Lahey spoke January 11 on "Some of the Newer Advances in Surgery of Later Years." Arthur P. Hitchens, Lieutenant Colonel in the Medical Corps, U. S. Army, and professor of public health and preventive medicine at the University of Pennsylvania School of Medicine spoke February 15 on "Medical Practice and the Converging Roads of Health and Welfare."

"The Chemotherapy of Disease with Special Reference to Sulfanilamide and Sulfapyridine" will be the subject discussed by Dr. John A. Kolmer, professor of medicine at Temple University, Philadelphia. Doctor Kolmer will speak March 13th.

Dr. Leroy U. Gardner of the Saranac Laboratory for the Study of Tuberculosis of the Edward L. Trudeau Foundation, Saranac Lake, New York, will discuss the general subject of "silicosis and tuberculo-silicosis."

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Yale University
School of Medicine

A library devoted to the history of medicine has been established. It will be housed in a separate building to be erected shortly. In addition to material already on hand, it will contain the famous Harvey Cushing collection, the library of Dr. John F. Fulton, Sterling professor of physiology, and the library of Dr. Arnold C. Klebs. The new building will be planned to house about 400,000 volumes. The three collections mentioned are among the most famous in the world and will make this library second only to the Surgeon General's Library in Washington. The scholar of medical history will have available the most significant books dealing with the history of medicine.

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University of California
Medical School

Almost fifty physicians from all parts of California attended the intensive postgraduate session on "Recently Acquired Knowledge Applicable in Practice" held at the Medical School, January 3 to 6, 1940. The course was presented in such a way as to meet the needs of the physician in general practice. Lectures were supplemented by demonstrations of patients as well as by pathological material and lantern slides.

Professor Raab, now on the faculty of the University of Vermont College of Medicine, formerly at the University of Vienna, spoke to the staff on "Angina Pectoris."

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Wayne University
College of Medicine

Dr. Edgar H. Norris, since 1938 professor of pathology, was elected dean of the school.

University of Minnesota
Medical School

Dean Harold S. Diehl of the University of Minnesota Medical School has been appointed a member of the National Advisory Health Council of the United States Public Health Service. The primary function of this Council is to advise with the Surgeon-General concerning the scientific and research work of the Public Health Service.

Dr. Ruth E. Boynton, Director of the University of Minnesota Students' Health Service and Professor of Preventive Medicine and Public Health, has been elected as President of the American Student Health Association.

Dr. George L. Streeter, Director of the Carnegie Laboratories at the Johns Hopkins Hospital, Baltimore, visited the University of Minnesota Medical School on January 17 and 18. He lectured before the medical faculty and students on "Early Stages of Macaque Development and Their Significance in Primate Embryology."

Dr. Albert V. Stoesser, Associate Professor of Pediatrics, University of Minnesota, has received a grant-in-aid from the John and Mary M. Markle Foundation in support of his studies on water and electrolyte metabolism in intractable asthma.

Mrs. John Dwan has made a gift of $5,000 to the Minnesota Medical Foundation for support of the program of the Human Serum Laboratory which was established at the University of Minnesota Medical School in 1938. The Laboratory is administered by a committee including Dr. Irvine McQuarrie, Dr. Paul Dwan and Dr. Erling Platou as a research and service project on the use of human serum for the prevention and treatment of certain infectious diseases.

Dr. Edward D. Churchill, John Homans professor of surgery at Harvard University and chief of the west surgical service at the Massachusetts General Hospital, will give the seventh E. Starr Judd lecture at the University of Minnesota in the Medical Science Amphitheater on March 14, at 8:15 P.M. The subject of Doctor Churchill's lecture is "Surgery of the Lungs."

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University of Georgia
School of Medicine

Dr. V. P. Sydenstricker, Professor of Medicine at the University of Georgia School of Medicine, has recently been awarded a grant of $6,000, by the Markle Foundation, for the continuation of his studies on pellagra. In the course of the spring Dr. Sydenstricker will present papers on: "Acute Deficiency Syndromes" at the Johns Hopkins Medical and Surgical Association, Baltimore on February 23rd; "The Present Status of Nicotine Acid," at the Federation of American Societies for Experimental Biology, at New Orleans on March 15th; "The Clinical Manifestations of Nicotine Acid and Riboflavine Deficiency" (Clinical Lecture) at the American College of Physicians, Cleveland on April 1st; "The Relation of Gastrointestinal Disease to Avitaminosis" at the New York Chapter of the American Gastroenterological Association at New York on April 15th and "Multiple Deficiency Features of Pellagra," at the 8th Pan-American Scientific Congress at Washington on May 10th.

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Woman's Medical College

Dr. Martha Tracy, dean since 1918, has been appointed assistant director of public health of Philadelphia. Dr. Tracy will retain the deanship until her successor is appointed.

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Northwestern University
Medical School

Colonel Robt. R. McCormick, owner and editor of the Chicago Tribune, has given to Northwestern University property the income from which is to be devoted to medical research. Mr. McCormick stipulated that this fund be designated the Irving S. Cutter Research Memorial Fund.

University of Cincinnati
College of Medicine

Dr. Stanley Dorst, acting dean since Dr. Alfred Friedlander, formerly dean, died, has been appointed dean on the recommendation of President Walters. This appointment also carries with it the position of Chief of Staff of the Cincinnati General Hospital and Director of the Christian R. Holmes Hospital. Dr. Dorst succeeds the late Dr. Alfred Friedlander who died May 28, 1939.

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Ohio State University
College of Medicine

The College announces its Seventh Annual Post-Collegiate Assembly for Friday and Saturday, March 29 and 30. The Faculty will conduct a series of Symposiums and Round Tables, together with a special course on "Anemic States" hourly on the first day. At noon, an Alumni reunion luncheon celebrating the 106th anniversary of continuous medical teaching will be held in honor of the new University President, Dr. Howard L. Bevis.

Dr. Haven Emerson, Director of the DeLamar Institute of Public Health, of the College of Physicians and Surgeons of Columbia University, will give the annual Alpha Omega Alpha lecture. His subject will be "Preventive Medicine: Personal and Public." Saturday, March 30, a list of guest speakers will talk on varied subjects. All these visiting lecturers, now members of medical faculties elsewhere, were graduates or former students at Ohio State University.

Dean J. H. J. Upham will present "An Interpretation of Current Research at Ohio State University."

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Emory University
School of Medicine

The endowment of the J. B. Whitehead chair of surgery was made possible by the gift of $250,000 by the Joseph B. Whitehead Foundation.

Louisiana State University
School of Medicine

The Executive Committee has approved a proposal to no longer confer the M.B. degree on L. S. U. graduates. The Committee has voted in favor of granting the M. D. degree upon the satisfactory completion of the fourth year. Members of the Committee feel that the action of the Louisiana State Board of Medical Examiners in requiring a year's rotating internship of all candidates who apply for registration in Louisiana makes it unnecessary for the School of Medicine to require this service before it confers the M. D. degree.

Dr. Julius Bauer, Clinical Professor of Medicine, delivered the Louis M. Warfield Memorial Lecture in Milwaukee, January 23, on the subject "Problems and practical value of constitutional pathology." This lecture is jointly sponsored by the Milwaukee Internists' Club, the Wisconsin Anti-Tuberculosis Association, and the Milwaukee Academy of Medicine. Dr. Bauer also addressed the students of Marquette University School of Medicine.

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University of Western Ontario
Faculty of Medicine

The first unit of the new Victoria Hospital, the main clinical teaching unit of the College, is now under construction. It is expected that the entire building will be completed early in 1941.

The new building will consist of six stories and a basement. The basement floor is designed for the admission of patients and will contain the outpatient services, dispensary, necropsy theater and students' locker room. The first floor is given over to the offices of administration, X-ray department and pathological museum. The second floor will house the Meek Memorial Laboratory which will provide not only for the routine laboratory work of the hospital but the teaching of pathology, bacteriology and clinical pathology will be conducted therein; and facilities for research will

be available. The third floor will supply accommodation for the patients of the eye, ear, nose and throat department. The fourth floor for private maternity patients will include labor rooms and nursery. The fifth floor will be for general medical and surgical private patient accommodation and the sixth floor will consist entirely of operating suites including special facilities for urological, bronchoscopic and orthopoedic work with the necessary radiological equipment.

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State University of Iowa
College of Medicine

Dr. Everett D. Plass, professor of obstetrics and gynecology, gave a series of lectures on obstetrics recently in Kingman, Williams, Flagstaff, Winslow, Holbrook, Safford, Phoenix, Yuma, Florence and Tucson. Among the subjects were delayed labor and contracted pelvis, toxemia of late pregnancy, anesthesia in obstetrics, delivery and postpartum routine, bleeding in early pregnancy, abortion and puerperal infection. The courses were financed by the maternal and child health division of the state department of health and were given in cooperation with the committee on maternal welfare of the state medical society.

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Bowman Gray School of Medicine
of Wake Forest College

Plans for the construction of the Bowman Gray School of Medicine of Wake Forest College and for the enlargement of the North Carolina Baptist Hospital are nearing completion, and it is thought that work on the building will begin around June 1.

The medical school building will be constructed across the north end of the present hospital, directly adjoining it. The hospital itself will be tripled in size by the addition of two wings—one at the rear, six stories high, and the other at the south end of the building, four stories high—and by the enlargement of the kitchen wing. Among the features of the medical school, which will be large enough to accommodate a maximum of 50 students in each class, will be an auditorium with a seating capacity of 300 and a library with a 50,000 volume capacity. In the enlarged hospital an amphitheatre with 100 seats will be built next to the operating room. Two floors of one wing will be given over to pediatrics.

Although the medical school and hospital will be separately owned and financed, they will be served by a joint professional staff. The school expects to cooperate with all other medical institutions in Winston-Salem and Forsyth County.

The total expenditure on buildings and equipment will be about $750,000, $300,000 of which will go for the medical school building alone. Funds for the medical school are being provided by the Bowman Gray Foundation. More than $200,000 has been subscribed throughout the state for the additions to the hospital.

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Duke University
School of Medicine

The following clinics have been held recently: January 26, "Testosterone Therapy in Hypogenitalism," by Dr. Samuel A. Vest, Jr., professor of urology, University of Virginia Medical School. February 27, "Appendicitis," by Dr. John M. T. Finney, Jr., associate in surgery, The Johns Hopkins University School of Medicine. February 28, "Influenza," by Dr. Thomas Francis, Jr., professor of bacteriology, New York University Medical College.

Through the grant of $175,000 from The Rockefeller Foundation, a department of psychiatry and mental hygiene has been established at Duke University, to be operated beginning September 1, 1940. The Highland Hospital, at Asheville, N. C., a gift to the University last year by Dr. Robert S. Carroll, will be used in connection with this department. Dr. Richard S. Lyman, now of the Phipps Psychiatric Clinic, The Johns Hopkins University, has been appointed head of the new department.

Tufts College
Medical School

Receipt of a gift of $42,200 from Dr. and Mrs. George G. Averill of Waterville, Maine, has been announced. The fund, to be turned over to the School during 1940 and 1941, will be devoted to the establishment of the "Dr. and Mrs. George G Averill Department of Anatomy in Memory of Professor Charles P. Thayer." Known as an industrialist, Dr. Averill was one of the first physicians graduated from Tufts nearly a half-century ago.

The new Medical School building, for which the gift will provide the entire top floor, will be situated in downtown Boston at the New England Medical Center, a location convenient to the Boston City Hospital and the other clinical teaching centers of the School. It will be erected as soon as the entire $750,000 needed has been obtained. Dr. Charles P. Thayer, in whose memory the gift was made, was one of the "original seven" founders of the School in 1893 and first head of the anatomy department.

In a statement accompanying his gift, Dr. Averill said, "The Tufts College Medical School has attained a singular position of responsibility to New England; since my graduation nearly a half-century ago these six states have come to depend more and more for their medical care and community health services on Tufts. Now the School trains more physicians for New England than any other medical school in the country. In the same period anatomy has attained recognition as a mother science, embracing all fields of medicine; it is important that students who will be the physicians of tomorrow have the best opportunity to study a subject which has become one of the major biological sciences concerned with life processes. As a New Englander I can think of no better investment than that which will support training at the School which is the chief source of our doctors." Dr. Averill also said that as a resident of Maine he had opportunity to observe first-hand the benefits of the community health services extended to local New England communities by the School and its partner units at the New England Medical Center. A new improved and modern School wil make the postgraduate program, diagnostic aid, and hospital extension services even more effective, he stated.

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University of Virginia
Department of Medicine

Sir James Purves Stewart, a distinguished neurologist of London, England, visited the Medical School January 12th.

Mr. Philipp B. Philipp of New York City and Albemarle County, Virginia has contributed $3,000 to the department of radiology for the purchase of additional x-ray equipment.

At the meeting of the American Microscopical Society in Columbus, Ohio in December, Dr. H. E. Jordan was elected President.

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Johns Hopkins University
School of Medicine

Dr. Perrin H. Long, associate professor of medicine, has been appointed head of a new department of preventive medicine. The department was established through a grant from the Rockefeller Foundation, allowing $350,000 during the next ten years.

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Louisiana State University
School of Medicine

The Committee on Scientific Research of the American Medical Association has renewed and extended for another year the grant to Dr. A. G. Eaton, assistant professor of physiology for continuation of his work on the absorption and metabolism of the amino acids.

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Long Island
College of Medicine

Dr. Howard W. Potter has been appointed clinical professor in the department of neurology and psychiatry.

General News

Francis Amory
Septennial Prize

By the will of the late Francis Amory, the American Academy of Arts and Sciences is made the trustee of a fund the income from which is to be awarded for conspicuously meritorious work performed during the immediately preceding septennial period "through experiment, study or otherwise, in the treatment and cure of disease and derangement of the human sexual generative organs in general, and more especially for the cure, prevention or relief of the retention of urine, cystitis prostatitis and so forth." While the donor wished expressly to reward the discovery of any new method of treatment, he expressly authorized that the prize may be given to any author who might have contributed any theoretical or practical treatise of extraordinary or exceptional value and merit on the anatomy of said organs or the treatment of their diseases.

The prize may be awarded in 1940. The total amount will exceed $10,000 which may be divided at the discretion of the Academy among several nominees. Communications should reach the committee not later than May 15, 1940 and should be addressed in care of the American Academy of Arts and Sciences, 28 Newberry Street, Boston. The members of the committee are: Dr. Roger I. Lee, chairman; Dr. Walter B. Cannon, Dr. David Cheever, Professor Leigh Hoadley, Dr. William C. Quimby, Dr. Ernest F. Tyzzer and Dr. Soma Weiss, secretary.

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The Society of the
New York Hospital
Lewis Cass Ledyard, Jr. Fellowship

The Lewis Cass Ledyard, Jr., Fellowship was established in 1939 by a gift from Mrs. Ruth E. Ledyard, wife of the late Lewis Cass Ledyard, Jr., a Governor of The New York Hospital. The income, amounting to approximately $4,000 annually, will be awarded to an investigator in the fields of medicine and surgery, or in any closely related field. This amount will be applied as follows: $3,000 as a stipend and, approximately, $1,000 for supplies or expenses of the research. In making the award, preference will be given to younger applicants who are graduates in medicine, and who have demonstrated fitness to carry on original research of high order. The recipient of this Fellowship will be required to submit reports of his work under the Fellowship, either at stated intervals or at the end of the academic year; and when the result of his work is published he will be expected to give proper credit to the Lewis Cass Ledyard, Jr. Fellowship. The research work under this Fellowship is to be carried on at The New York Hospital and Cornell University Medical College. The fellowship will be available on July 1st at the beginning of the academic year. Applicants for the year 1940-41 should be in the hands of the Committee by the 15th of February. It is expected that the award will be made by April 1, 1940.

Application for this Fellowship should be addressed to: The Committee of the Lewis Cass Ledyard, Jr. Fellowship, The Society of The New York Hospital, 525 East 68th Street, New York, N. Y.

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National Board of
Medical Examiners

Doctor Armstrong, professor of anatomy, Syracuse University, was recently elected a member of the National Board of Medical Examiners to succeed the late Dr. Charles R. Stockard, of Cornell.

Doctor Keeton, professor of medicine, University of Illinois, was recently elected a member of the National Board

of Medical Examiners to succeed the late Dr. Charles A. Elliott, of Northwestern.

Doctor Keeton is one of the first diplomates of the National Board, holding Certificate Number 25. He is chairman and a former secretary of its Chicago Subsidiary Board.

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Research Fellowships in Medicine and Dentistry, Graduate School of the University of Illinois

The Graduate School of the University of Illinois has established four research fellowships to be awarded for one year in the fields of medicine and dentistry in Chicago at a stipend of $1,200 per year (calendar year with one month's vacation). Fellows are eligible for re-appointment in competition with the new applicants.

Candidates for these fellowships must have completed a training of not less than eight years beyond high school graduation. This training may have been acquired in any one of the following ways, or the equivalent thereof: (1) Work leading to the B.S. and M.D. degrees (In some instances the candidates would have the M.S. degree, or an additional year or two of hospital training beyond the intern year.) (2) Work leading to the B.S., M.S. and D.D.S. degrees. (3) Work leading to the B.S. or B.A. degree in a four year collegiate course and to the D.D.S. degree. (4) Work leading to the B.S., D.D.S. and M.D. degrees.

Candidates should indicate the field of research in which they are interested and submit complete transcripts of their scholastic credits, together with the names of three former science teachers as references. March 1 is the dead line for acceptance of applications. Announcement of the fellowship awards will be made April 1, becoming effective September 1.

Formal application blanks may be secured from the Secretary of the Committee on Graduate Work in Medicine and Dentistry, 1853 W. Polk Street, Chicago, Illinois.

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The Commonwealth Fund

Appropriations "for the welfare of mankind" amounting, approximately, to $1,900,000 are reported by the Commonwealth Fund in a review of its twenty-first year. About two-thirds of the appropriations made in 1938-1939 were for the promotion of health through medical education, medical research, public health and the rural hospital program. In medical research, continuing or repeated grants bulk much larger than the new ones.

Twelve more young teachers of medicine were given fellowships to fit them for the greater usefulness in teaching or research or both. These fellowships are given at small and large schools, in preclinical and clinical departments. The colleges receiving these fellows were: Emory, Harvard, Long Island, Louisville, New York University, Pennsylvania, Tulane, Vanderbilt, Western Reserve and Yale. At three schools where the Fund continues to subsidize the teaching of preventive medicine, scholarships are provided for undergraduates who will practice for a term of years in small towns.

In two instances, fellowships have been awarded to men just completing residencies who can now be promised part time appointments to the teaching staff but must look to private practice for the bulk of their support. This is an experimental arrangement, but in schools where a full time appointment seems to be an unattainable luxury, the deliberate preparation of young men for faculty appointments seems to hold more promise for the raising of teaching standards than the usual methods of recruiting a part time staff.

Book News

Gynecology: Medical and Surgical

By P. Brooke Bland, M.D., Professor Emeritus of Obstetrics, assisted by Arthur First, M.D., Associate in Obstetrics, Jefferson Medical College. 3rd Ed. F. A. Davis Company, Philadelphia. 1939. Price, $8.

Gynecologic anatomy and physiology are stressed more than is usually the case in a textbook on gynecology. Endocrine therapy is embodied in a special chapter as is endometriosis. The importance of conservative practice is emphasized, surgically as well as medically. Standard surgical procedures are discussed fully. Others are described briefly. A special chapter is given over to gynecological radiology.

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Physiology in Health and Disease

By Carl J. Wiggers, M.D., Professor of Physiology, School of Medicine, Western Reserve University. 3rd Ed. Lea & Febiger, Philadelphia. 1939. Price, $9.50.

The new edition of this work represents a thorough revision of the material. It contains a wealth of information and is well organized and well written. It correlates clinical medicine with physiology and stresses the treatment of physiological subjects. Many new illustrations have been added and 1400 new references have been incorporated in the unusually lengthy list included in the previous editions. The index is most comprehensive and includes an abundance of cross-references.

The discussion of many topics of current interest has been expanded to cover new knowledge and new conceptions. This mass of material is so organized as to make the essential facts readily accessible. Here is a combination of fundamental principles and practical applications.

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Handbook of Elementary Psychobiology and Psychiatry

By Edward G. Billings, M.D., Assistant Professor of Psychiatry, University of Colorado School of Medicine. The Macmillan Company, New York. 1939. Price, $2.

Here is organized into compendium form the material of psychobiology and psychiatry in terms that will make it possible for the student to orient himself in the study and management of the disorders of personality functioning as they occur in clinical medicine and psychiatry. Every student will find this book very useful. Psychobiology and psychiatry will have fewer terrors for him and their significant position in the daily work of the physician will be stressed and management and treatment simplified.

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Physiological Chemistry

By Albert P. Mathews, Ph.D., Andrew Carnegie Professor of Biochemistry, University of Cincinnati. 6th Ed. A William Wood Book: The Williams & Wilkins Company. 1939. Price, $8.

This book is too well and favorably known to require special comment. The author presents the fundamentals of the chemistry of the body in an interesting and instructive way and in an objective fashion, so that any one reading the book will obtain a fairly just estimate of the problems of the science, a sane point of view and a fair knowledge of the present state of information about the subject. Many new references have been added. The text is brought up to date. The practical section has been omitted.

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Textbook of Nervous Diseases

By Robert Bing, Professor of Neurology, University of Basle, Switzerland. Translated and Enlarged by Webb Haymaker, Assistant Clinical Professor of Neurology and Lecturer in Neuroanatomy, University of California. From the Fifth German Edition. The C. V. Mosby Company, St. Louis. 1939. Price, $10.

This translation differs from the original in that the material has been considerably rearranged, augmented and adapted to American and British usage. Considerable data as regards anatomy and physiology have been added in various parts of the text. The book is well illustrated. Bibliographic references are appended to each chapter. The author deserves to be complimented especially on his fine index.

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Pictorial Midwifery

By Sir Comyns Berkeley, Consulting Obstetric Surgeon to the Middlesex Hospital. 3rd Ed. A William Wood Book: The Williams & Wilkins Company, Baltimore. 1939. Price, $3.

An atlas of midwifery gotten up primarily for pupil midwives but it should appeal also to medical students. The text consists of legends for the illustrations of which there are 245.

Stedman's Practical Dictionary

By the late Thomas L. Stedman and Stanley T. Garber, M.D. 14th Ed. A William Wood Book: The Williams & Wilkins Company, Baltimore. 1939. Price (thumb indexed), $7.50; without thumb index, $7.00.

Personally edited, for 27 years, by Dr. Thomas Lathrop Stedman who until his death in 1938 was actively engaged in the work of preparing this fourteenth edition of his dictionary. The present editor, Dr. Stanley Thomas Garber, began his work in collaboration with Dr. Stedman and presents a new edition that retains the superior qualities of this dictionary that made the original editor known the world over as one of the greatest authorities on medical terminology and lexicology.

The present edition contains many new titles and subtitles including numerous recently isolated hormones, vitamins and chemical compounds of therapeutic value. All the changes in the first supplement of the eleventh edition of the U. S. Pharmacopoeia are noted. The new British anatomical terms, suggested by way of revision of the Basle Anatomical Nomenclature, are again included in an Appendix together with their BNA equivalents.

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Obstetrical Practice

By Alfred C. Beck, M.D., Professor of Obstetrics and Gynecology, Long Island College of Medicine. 2nd Ed. The Williams & Wilkins Company, Baltimore. 1939. Price, $19.

A large part of the text has been rewritten, especially the part dealing with the physiology of reproduction. A chapter on retained and adherent placenta has been added. The material on resuscitation of the new born infant has been brought into line with recent observations on asphyxia and the physiology of respiration. There are 1,043 illustrations which enhance the value of the book for the student.

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Obstetrical Manikin Practice

By Lyle G. McNeile, M.D., Professor of Obstetrics and Gynecology, University of Southern California School of Medicine. A William Wood Book: The Williams & Wilkins Company, Baltimore, 1939. Price, $2.

This outline is issued as a means of relieving the student of the tedium of note taking and to serve as a reference covering the scope of the course. Only such operations and procedures as can be clearly demonstrated by models and manikin practice are included. It is essentially a description of a manikin course, covering twelve hours, given to small sections of students, in obstetrics.

Psychobiology and Psychiatry

A Textbook of Normal and Abnormal Human Behavior. By Wendell Muncie, M.D., Associate Professor of Psychiatry, Johns Hopkins University; with a foreword by Adolph Meyer, M.D., Henry Phipps Professor of Psychiatry, Johns Hopkins University. The C. V. Mosby Company, St. Louis. 1939. Price, $8.

The author attempts to give a fair account of the conceptions, teaching and working methods of the Henry Phipps Clinic in Psychiatry as currently constituted, with enough historical background to make the present understandable as a developmental product from the past and to give a vision of the future. The text is aimed primarily for the use of students. The material is covered mostly in the obligatory and elective courses in psychobiology and psychiatry at the Johns Hopkins Medical School. It is divided into four parts: I: Psychobiology, the Study of Normal Behavior; II: Abnormal Behavior; Pathology and Psychiatry; III: Treatment; IV: Historical Survey in Bibliography of the Development of the Concepts Underlying the Principal Reaction Sets. Citation of cases illustrates the text in many instances.

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Synopsis of Pediatrics

By John Zahorsky, M.D., Professor and Director of the Department of Obstetrics, and T. S. Zahorsky, M.D., Instructor in Pediatrics, St. Louis University School of Medicine. The C. V. Mosby Company, St. Louis. 1939. Price, $4.

A textbook for the undergraduate student. References to the preclinical sciences and to diseases studied more thoroughly in other clinical departments are either omitted entirely or given only brief mention. The book is divided into sixty chapters, one for each lecture assigned to pediatrics. There are no bibliographic references in order to give space to the elements of pediatrics.

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Human Helminthology

By Ernest C. Faust, Ph.D., Professor of Parasitology, Tulane University of Louisiana. 2nd Ed. Lea & Febiger, Philadelphia. 1939. Price, $8.50.

This edition covers all the important advances in biological and clinical knowledge of helminthic infections and contains an entirely new chapter on anthelmintics and their use. The helminth parasites are classified in accordance with the International Code of Zoological Nomenclature, and each important species is considered from the point of view of its historical background, its structure, life cycle, geographical distribution, epidemiology, pathology, symptomatology, diagnosis, therapeusis, prognosis and prophylaxis.

Outline of Physiology

By William R. Amberson, Ph.D., Professor of Physiology, and Dietrich C. Smith, Ph.D., Associate Professor of Physiology, University of Maryland. The Williams & Wilkins Company, Baltimore. 1939. Price, $4.

This is a mammalian—and mainly human—physiology with some general material as a necessary foundation. The historical approach is frequently used, with extensive quotations from classical papers. Each chapter is headed by appropriate quotations most from the early investigators in physiology. The book lays a groundwork of basic biochemical and biophysical conceptions as preparation for the later more strictly physiological discussions. It includes simple descriptions of the recent advances in physiology such as x-ray analysis of muscle structure, electrical discharges in nerves and brain, the vitamins, and the endocrine glands. It presents simplified diagrams in color to illustrate the structure and function of the central nervous system. It includes new diagrams in color to show the sensory receptors of eye, ear, vestibular apparatus, skin, lungs, blood vessels, and muscles. Altogether it offers an abundance of figures, most of which are newly drawn.

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Handbook of Bacteriology

By Joseph W. Bigger, M.D., Professor of Bacteriology and Preventive Medicine, University of Dublin. 5th Ed. A William Wood Book: The Williams & Wilkins Company, Baltimore. 1939. Price, $4.25.

A handbook for the student. Its worth is attested by the fact that the book is now in its fifth edition.

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Population, Race and Eugenics

By Morris Siegel, M.D., Hamilton, Ontario, Canada. 1939, Price, $2.50.

Part I: Positive Eugenics (population; etiology; construction and recommendations; racial theories in relation to eugenics; rational marriage). Part II: (The feebleminded; mental disorders; epilepsy; restrictive measures; general conclusions.)

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Tumors of the Hands and Feet

By George T. Pack, M.D., Assistant Professor of Clinical Surgery, Yale University School of Medicine and Cornell University Medical College. The C. V. Mosby Company, St. Louis. 1939. Price, $3.

The symposium which comprises the subject matter of this small book originally appeared in the January, 1939, issue of *Surgery* and is here presented as a monograph.

The Physiological Basis of Medical Practice.

By Charles H. Best, M.D., Professor and Head of the Department of Physiology, and Norman B. Taylor, M.D., Professor of Physiology, University of Toronto. 2nd. Ed. A William Wood Book: Williams & Wilkins Company, Baltimore. 1939. Price, $10.

A fine correlation of physiology with clinical medicine which will go far to make the student conscious of the need of knowing physiology and how to apply it in practice. This edition includes a new section devoted to a comprehensive discussion of special sense physiology.

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Tumors of the Skin: Benign and Malignant

By Joseph J. Eller, M.D. Attending Dermatologist, City Hospital, New York City. Lea & Febiger, Philadelphia. 1931. Price, $10.

This book covers the entire field of benign and malignant tumors of the skin. Its objective is to give all of the available information on the diagnosis and treatment of benign and malignant tumors of the skin. It includes clinical descriptions and photographs of the various neoplasms with discussions of the best methods of therapy. Precancerous lesions and their treatment are covered and emphasis is placed on the recognition and management of cancer in its early stages. A thorough histopathologic study of various tumors is included with its relationship to treatment.

The principles and technic of roentgen and radium therapy for skin tumors are fully discussed. The appendix contains practical data on radiation physics and biology, including dosage tables and charts.

A special chapter is devoted to cutaneous surgery and plastic repair of skin tumors. The types of cases are indicated in which it is advisable to use surgery, or to combine surgical excision with irradiation or electrocoagulation. The technic of cutaneous surgery is described with the different methods of incisions and closures. The various kinds of skin grafting and the technic to be employed for plastic repair following excision of skin tumors are described with clinical illustrations and diagrammatic drawings.

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A Mirror for Surgeons

Select Readings in Surgery. By Sir D'Arcy Power, St. Bartholomew's Hospital, London. Little, Brown & Company, Boston. 1939. Price, $2.

Twenty-two word delineations of famous surgeons, four of them from the United States. These biographies make delectable reading and should stimulate every reader to emulation. Written as only Power can write.

Principles and Practice of Aviation Medicine

By Harry G. Armstrong, M.D. Captain, Medical Corps, U. S. Army; Director Aero Medical Research Laboratory. A William Wood Book: Williams & Wilkins Company, Baltimore. 1939. Price, $6.50.

Aviation medicine is presented as a distinct and separate subject, not as a disconnected collection of several other medical specialties. The pathological conditions peculiar to aviation medicine are shown to be definite clinical entities rather than isolated experimental findings.

This compact treatise incorporates the essence of more than 4000 separate papers on the subject . . . plus a great amount of entirely new original material which has never previously appeared in print; includes everything a flight surgeon must know about selection and care of the flier; constitutes a modern basis for the investigation of the effect of flight on man (physiologically and psychologically); evaluates the existing remedies for adverse conditions and points to the development of new means.

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The Surgery of Injury and Plastic Repair

By Samuel Fomon, M.D., Formerly Major Medical Corps, U. S. Army. A William Wood Book: Williams & Wilkins Company, Baltimore. 1939. Price, $15.

This book covers a phase of surgery that has been most recently developed and is now recognized as the ultimate aim of all surgery: complete physiological rehabilitation and anatomical restoration of the patient.

The work deals with repair following injury — both accidental and operative — and the correction of congenital and acquired deformities. It correlates for the first time those modern procedures that have been tested and standardized by leading authorities here and abroad. Operations adequately described in standard texts are omitted to avoid unnecessary repetition.

Based on thousands of drawings and illustrations and written in simple language, the presentation of the procedures is lucid and practical. All steps of the operations can be carried out effectively by any surgeon acquainting himself with the precepts laid down.

The detailed account of accepted present-day methods for early care of the injured renders the first part of the book (as well as the first part of every special chapter) highly useful as a modern office-surgery. It equips the general practitioner with full knowledge of those initial procedures and precautions that, though easily performed, will lead to optimal final results.

Fractures

By Paul B. Magnuson, M.D., Associate Professor of Surgery, Northwestern University Medical School. 3rd Ed. J. B. Lippincott Company, Philadelphia. 1939. Price, $4.

Revised and enlarged. A good book for the student because it presents information which meets the needs of the man who first sees the fracture and should go far to overcome errors in treatment sometimes made by the "first man" or he who is not sufficiently experienced in the treatment of fractures. The student cannot know too much about this subject. Profusely illustrated and supplying an excellent bibliography.

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Fundamentals of Biochemistry

In Relation to Human Physiology. By T. R. Parsons, M.A., Sidney Sussex College, Cambridge, England. 6th Ed. William Wood & Company, Baltimore. 1939. Price, $3.

This is an attempt to describe in a continuous story the more important, generally accepted, principles which have been derived from the study of the chemical changes occurring in the human body. In the main, it is an introduction to biochemistry, to be supplemented by reading and information gleaned from many sources. It is a very handy book for the medical student to have and to peruse with understanding.